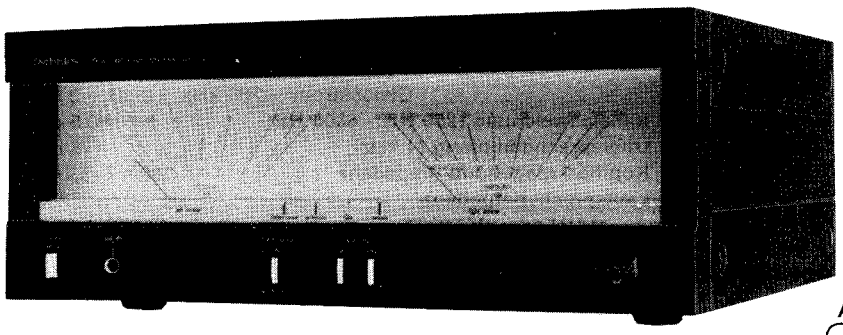
Service Manual

Stereo DC Power Amplifier

SE-A5(K)

〔D〕,〔EG〕,〔EW〕,〔EK〕,
〔EH〕,〔EF〕,〔EB〕,〔XL〕,〔XA〕



* The black type model is provided with (K) in the Service Manual. SE-A5(K)
* The colors of this model is black type only.

Areas

* [D] and [EG] are available in Scandinavia and European except Switzerland, United Kingdom, Holland, France and Belgium.
* [EW] is available in Switzerland.
* [EK] is available in United Kingdom.
* [EH] is available in Holland.
* [EF] is available in France.
* [EB] is available in Belgium.
* [XL] is available in Australia.
* [XA] is available in Asia, Latin America, Middle East and Africa.

English

Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

■ AMPLIFIER SECTION

20 Hz~20 kHz continuous power output	
both channels driven	2 × 160W (4Ω)
	2 × 120W (8Ω)
40 Hz~16 kHz continuous power output	
both channels driven	2 × 160W (4Ω)
	2 × 120W (8Ω)
1 kHz continuous power output	
both channels driven	2 × 180W (4Ω)
	2 × 130W (8Ω)
Total harmonic distortion	
rated power at 20 Hz~20 kHz	0.003% (4Ω)
	0.002% (8Ω)
rated power at 40 Hz~16 kHz	0.003% (4Ω)
	0.002% (8Ω)
rated power at 1 kHz	0.003% (4Ω)
	0.002% (8Ω)
half power at 20 Hz~20 kHz	0.001% (8Ω)
half power at 1 kHz	0.0005% (8Ω)
−26 dB power at 1 kHz	0.001% (4Ω)
50 mW power at 1 kHz	0.001% (4Ω)
Intermodulation distortion	
rated power at 250 Hz: 8 kHz=4:1, 4Ω	0.003%
rated power at 60 Hz: 7 kHz=4:1, SMPTE, 8Ω	0.002%
TIM (Transient Intermodulation Distortion)	unmeasurably small
Power bandwidth	
both channels driven, −3 dB	
T.H.D. 0.007%	5 Hz~100 kHz (8Ω)
Residual hum and noise	0.1 mV
Damping factor	70 (4Ω), 140 (8Ω)
Input sensitivity and impedance	1 V/47kΩ
S/N	108 dB (123 dB, IHF, A)
Frequency response	
	DC~20 kHz, +0 dB, −0.1 dB
	DC~200 kHz, +0 dB, −3 dB
Channel balance, 250 Hz~6,300 Hz	±0.5 dB
Channel separation, 1 kHz	75 dB
Headphones output level and impedance	730 mV/330Ω
Load impedance	
MAIN or REMOTE	4Ω~16Ω
MAIN and REMOTE	8Ω~16Ω
Meter	
reading range	0.0001 W~300 W (8Ω)
	−60 dB~+5 dB
	(logarithmic compression)
frequency response (reading accuracy)	
	20 Hz~20 kHz ±2 dB (more than −50 dB)
	20 Hz~20 kHz ±3 dB (less than −50 dB)

■ GENERAL

Power consumption	1000W
Power supply	AC 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (W×H×D)	430 × 178 × 416 mm
Weight	18.4 kg

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Deutsch

TECHNISCHE DATEN

(Spezifikationen Können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ VERSTÄRKERTEIL

Dauerton-Ausgangsleistung bei 20 Hz ~ 20 kHz
beide Kanäle ausgesteuert 2 × 160W (4 Ω)
2 × 120W (8 Ω)
Dauerton-Ausgangsleistung bei 40 Hz ~ 16 kHz
beide Kanäle ausgesteuert 2 × 160W (4 Ω)
2 × 120W (8 Ω)
Dauerton-Ausgangsleistung bei 1 kHz
beide Kanäle ausgesteuert 2 × 180W (4 Ω)
2 × 130W (8 Ω)
Gesamtklirrfaktor
Nennleistung bei 20 Hz ~ 20 kHz 0,003% (4 Ω)
0,002% (8 Ω)
Nennleistung bei 40 Hz ~ 16 kHz 0,003% (4 Ω)
0,002% (8 Ω)
Nennleistung bei 1 kHz 0,003% (4 Ω)
0,002% (8 Ω)
halbe Nennleistung bei 20 Hz ~ 20 kHz 0,001% (8 Ω)
halbe Nennleistung bei 1 kHz 0,0005% (8 Ω)
−26 dB Leistung bei 1 kHz 0,001% (4 Ω)
50 mW Leistung bei 1 kHz 0,001% (4 Ω)
Intermodulationsfaktor
Nennleistung bei 250 Hz: 8 kHz = 4:1, 4 Ω 0,003%
Nennleistung bei 60 Hz: 7 kHz = 4:1, nach SMPTE, 8 Ω 0,002%
TIM (Intermodulationsverzerrung) unmeßbar
Leistungsbandbreite
beide Kanäle ausgesteuert bei −3 dB
T.H.D. 0,007% 5 Hz ~ 100 kHz (8 Ω)
Restbrumm und Geräusch 0,1 mV
Dämpfungsfaktor 70 (4 Ω), 140 (8 Ω)
Eingangsempfindlichkeit und -impedanz 1 V/47 kΩ
Geräuschabstand 108 dB (123 dB nach IHF, A)
Frequenzgang
Gleichstrom ~ 20 kHz, +0 dB, −0,1 dB
Gleichstrom ~ 200 kHz, +0 dB, −3 dB
Kanalabweichung (250 Hz ~ 6300 Hz) ±0,5 dB
Übersprechdämpfung (1 kHz) 75 dB
Kopfhörerpegel und -impedanz 730 mV/330 Ω
Lautsprecherimpedanz
MAIN oder REMOTE 4 Ω ~ 16 Ω
MAIN und REMOTE 8 Ω ~ 16 Ω
Instrument
Anzeigebereich 0,0001 W ~ 300 W (8 Ω)
−60 dB ~ +5 dB
(logarithmisch)
Frequenzbereich (Ablesegenauigkeit)
20 Hz ~ 20 kHz ±2 dB (über −50 dB)
20 Hz ~ 20 kHz ±3 dB (unter −50 dB)

■ ALLGEMEINE DATEN

Leistungsaufnahme 1000 W
Netzspannung
Wechselstrom 50 Hz/60 Hz, 110V/120V/220V/240V
Abmessungen (B × H × T) 430 × 178 × 416 mm
Gewicht 18,4 kg

Français

CARACTERSTIQUES

(Sujet á changement sans préaris.)

(DIN 45 500)

■ SECTION AMPLIFICATEUR

Puissance de sortie continue de 20 Hz~20 kHz,
les deux canaux en circuit 2 × 160W (4Ω)
2 × 120W (8Ω)
Puissance de sortie continue de 40 Hz~16 kHz,
les deux canaux en circuit 2 × 160W (4Ω)
2 × 120W (8Ω)
Puissance de sortie continue à 1 kHz
les deux canaux en circuit 2 × 180W (4Ω)
2 × 130W (8Ω)
Distorsion harmonique totale
à puissance nominale (20 Hz~20 kHz) 0,003% (4Ω)
0,002% (8Ω)
à puissance nominale (40 Hz~16 kHz) 0,003% (4Ω)
0,002% (8Ω)
à puissance nominale (1 kHz) 0,003% (4Ω)
0,002% (8Ω)
à demi-puissance (20 Hz~20 kHz) 0,001% (8Ω)
à demi-puissance (1 kHz) 0,0005% (8Ω)
puissance de −26 dB à 1 kHz 0,001% (4Ω)
puissance de 50 mW à 1 kHz 0,001% (4Ω)
Distorsion d'intermodulation
à puissance nominale à 250 Hz: 8 kHz=4:1, 4Ω 0,003%
à puissance nominale à 60 Hz: 7 kHz=4:1, SMPTE, 8Ω 0,002%
TIM (distorsion d'intermodulation transitoire) infiniment petite
Réponse de fréquences
les deux canaux en circuit, −3 dB
T.H.D. 0,007% 5 Hz~100 kHz (8Ω)
Bruit et ronflement résiduels 0,1 mV
Coefficient d'amortissement 70 (4Ω), 140 (8Ω)
Sensibilité et impédance d'entrée 1 V/47kΩ
Signal/Bruit 108 dB (123 dB, IHF, A)
Réponse de fréquence
CC~20 kHz, + 0 dB, −0,1 dB
CC~200 kHz, +0 dB, −3 dB
Equilibrage des canaux, 250 Hz~6,300 Hz ±0,5 dB
Séparation des canaux, 1 kHz 75 dB
Niveau de sortie des casques et impédance 730 mV/330Ω
Impédance de charge
PRINCIPALE ou AUXILIAIRE (MAIN or REMOTE) 4Ω~16Ω
PRINCIPALE et AUXILIAIRE (MAIN and REMOTE) 8Ω~16Ω
Indicateur
gamme de lecture 0,0001 W~300 W (8Ω)
−60 dB~+5 dB
(compression logarithmique)
réponse de fréquence (précision de lecture)
20 Hz~20 kHz ±2 dB (plus que −50 dB)
20 Hz~20 kHz ±3 dB (moins que −50 dB)

■ DIVERS

Consommation 1000W
Alimentation CA 50 Hz/60 Hz, 110V/120V/220V/240V
Dimensions (L × H × Pr) 430 × 178 × 416 mm
Poids 18,4 kg

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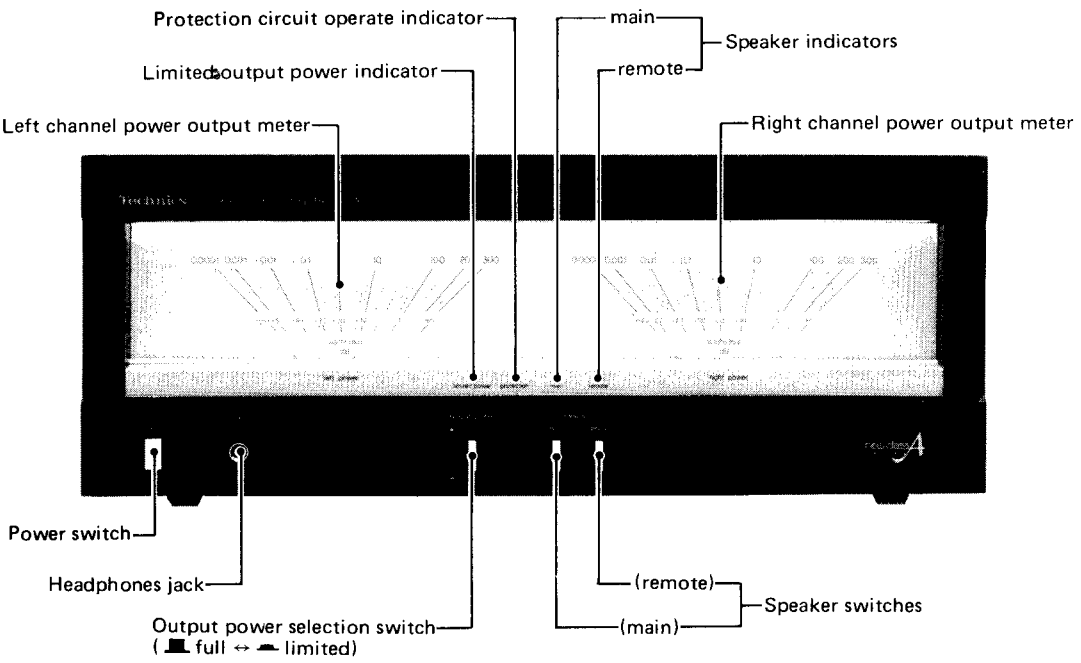
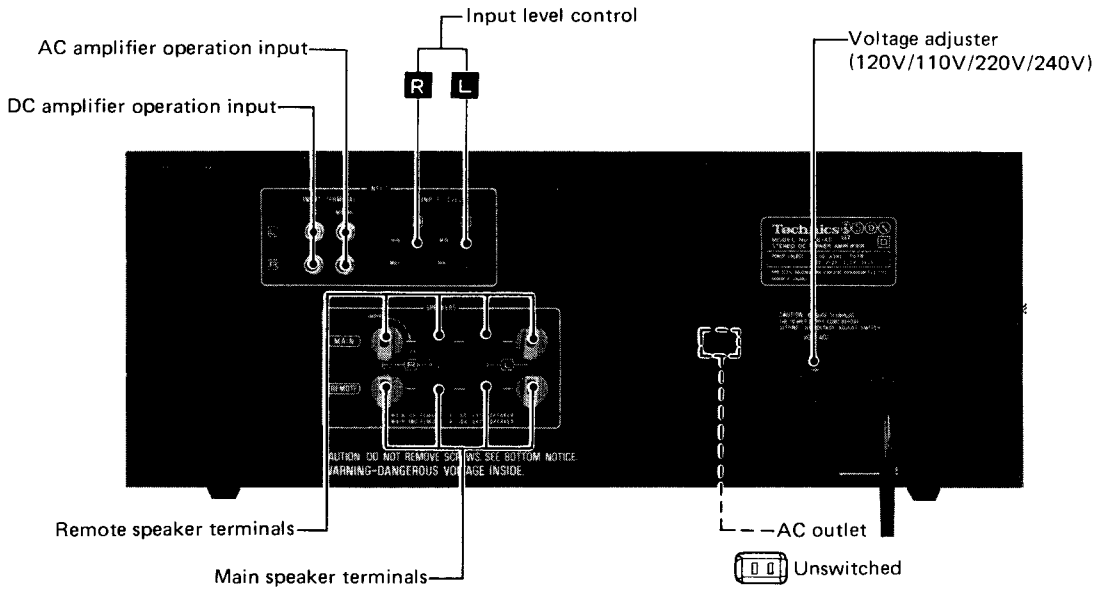
■ LOCATION OF CONTROLS



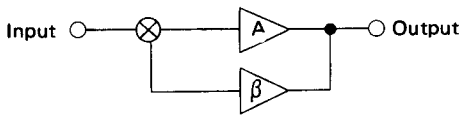


The products for destination [XA] is eqquipped with AC outlet.

■ L.F.B. AND LIMITED OUTPUT POWER

- **One of the important features of this unit is a linear freedback (LFB) circuit.**
  This circuit is the essence of multi-feedback technology of amplifier circuit, and is really an epock-making circuit that can theoretically realize zero distortion and output impedance by forming an amplifier having infinite amplification within NF loop.
  A brief explanation of NF amplifier is given below.
  It is not too much to say that the technical innovation has been carried out in order to increase A (bare gain) and to minimize Zo (bare output impedance) and Do (bare distortion) for the improvement of NF amplifier.
  When bare gain is increased through multi-stage amplification, the phase characteristic of high frequency range will worsen and it may result in worsening of performance and sound quality because of limitations on NF stability.
  Also, if it is intended to reduce the bare distortion, it results in reduction of distortion due to the circuit configuration of SLPT (Super linear power transistor) or synchro bias circuit, but there exist theoretical limitations because of using active elements. The linear feedback circuit is the result of further development in realizing infinite bare gain without worsening the phase characteristic of high frequency range that is recognized as ideal for NF amplifier.

Theoretical analysis of NFB amplifier



A : Bare (before-NF) gain
Do : Bare distortion
Zo : Bare output impedance
β : Feedback constant

- **After-NF gain** $A_{NF} = \frac{A}{1 + A\beta} = \frac{1}{\frac{1}{A} + \beta}$

  If $A = \infty$, $1/A = 0$. Therefore, $A_{NF} = 1/\beta$.

- **After-NF distortion** $D_{NF} = \frac{Do}{1 + A\beta}$

  If $A = \infty$, Then $D_{NF} = 0$.

- **After-NF output impedance** $Z_{NF} = \frac{Zo}{1 + A\beta}$

  If $A = \infty$, $Z_{NF} = 0$

Fig. 1

- Another feature of this unit is an output power selector switch. High output of 120W + 120W is obtainable at "full", and 30W + 30W, at "limited".
  Selecting the latter position means that the 30W amplifier is operated with a large 120W amplifier, and this is a luxurious pleasure in the silence of the night. When the switch is set to "limited", the meter lamp turns OFF.

■ PRECAUTIONS FOR CONNECTIONS

Befor making connections, be absolutely sure that the power to this unit and all other connected equipment is first turned off.
If connections are made while the power is on, a large input will be applied to the speaker systems, which might damage them, so special care should be taken concerning this point.

■ DISASSEMBLY INSTRUCTIONS

- **How to remove the cabinet**
  Remove the 10 setscrews. (❶ ~ ❿ in fig. 2)
- **How to remove the front panel**
  Remove the 4 setscrews. (⓫ ~ ⓮ in fig. 2)
- **How to remove the bottom board**
  Remove the 9 setscrews. (⓯ ~ ㉓ in fig. 3)
- **How to remove the power meter**

1. Remove the cabinet, front panel and bottom board.
2. Remove the 2 setscrews ㉖ and ㉗ (Fig. 4), and the clamp piece of lamps.
3. Remove the meter circuit board setscrew ㉘ (Fig. 5).
4. Remove the setscrews (㉙ ~ ㉜ in fig. 4) and pull out the front chassis.
5. Remove the 6 meter setscrews. (㉝ ~ ㊳ in fig. 6)
6. Remove the nut ㊴ (Fig. 7) to detach the meter from the chassis.

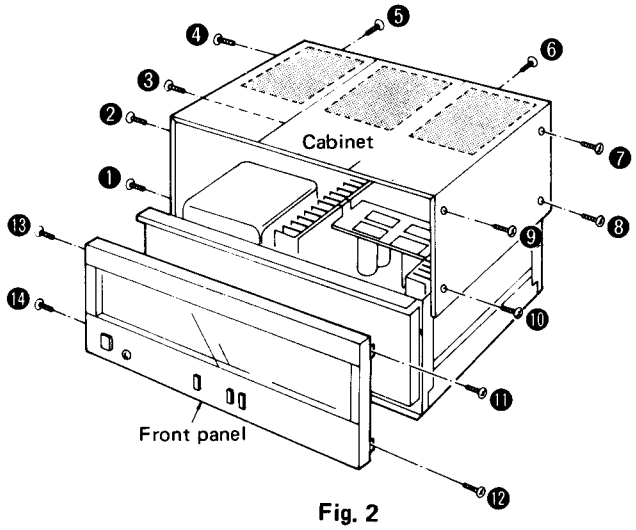


Fig. 2

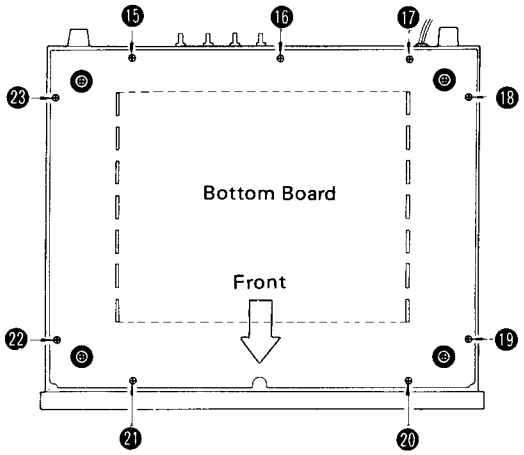


Fig. 3

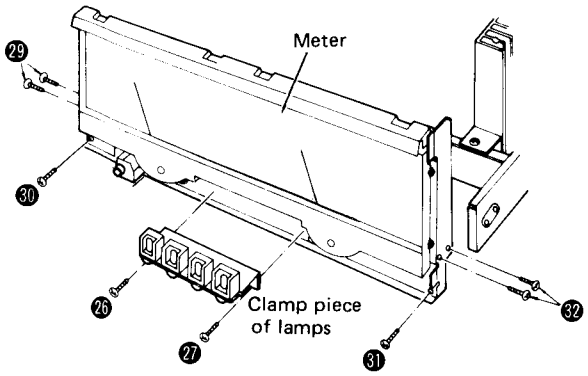


Fig. 4

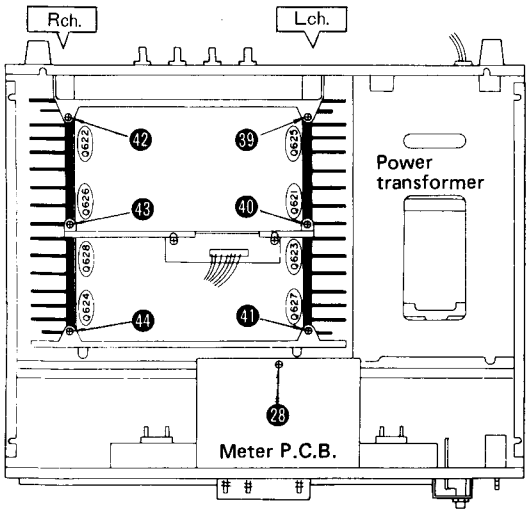


Fig. 5

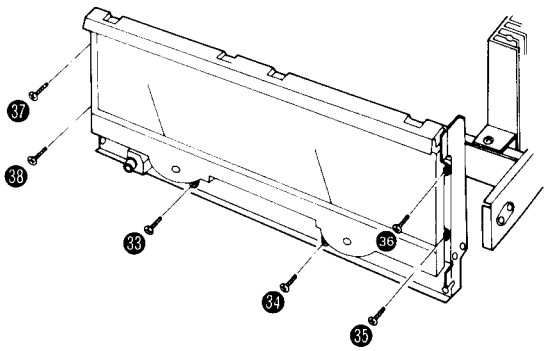


Fig. 6

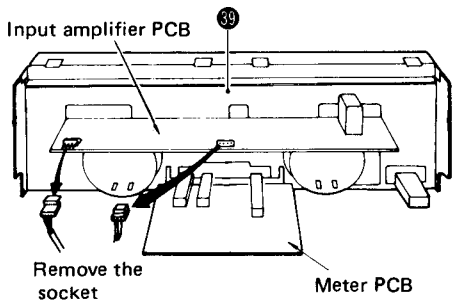


Fig. 7

- **Replacement of power transistor**
  1. Remove the cabinet and the bottom board.
  2. Remove the electrolytic condenser retainer for power source from the heat sink.
  3. Unsolder the power transistor on the L or R channel.
  4. Remove the heat sink setscrews (㊴ ~ ㊶) or (㊷ ~ ㊹) on the L or R channel as in fig. 5.
  5. Remove the heat sink from the printed circuit board, and lift it.
  6. Replace the power transistor.
  7. When installing the transistor, apply heat diffusing agent to both sides of the mica plate.
     Also, fasten the radiator plate on Q627 and Q624 with setscrew ㊺ as in Fig. 8.
     Apply heat diffusing agent to the head of temperature compensation/bias control transistor, and press it with the radiator plate.

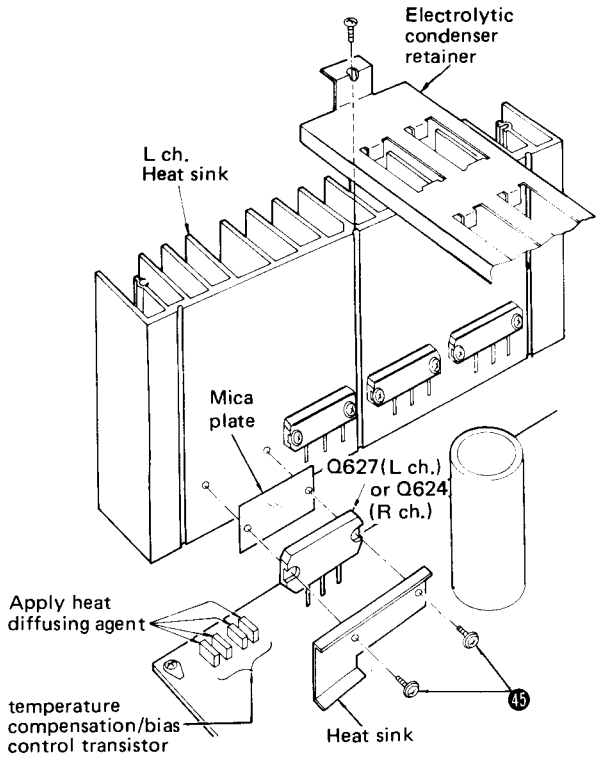


Fig. 8

- **How to remove the synchro bias circuit cover** (Fig. 9)
  The projections of the shield cover are inserted into the hole of printed circuit board and they are soldered.

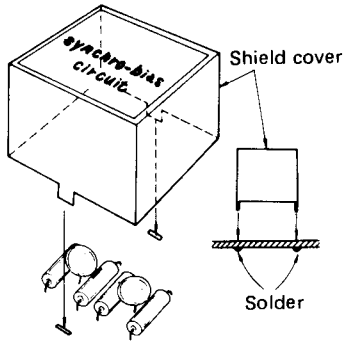


Fig. 9

■ MEASUREMENT AND ADJUSTMENTS ENGLISH

- **Before starting the repairing**

Before adjusting or repairing, be sure to short-circuit opposite poles of the 10000μF capacitors (C405 ~ C408) with a resistor approximately of 10Ω, 10W for discharging the charged voltage.
Short-circuiting with a screw driver and the like is not only dangerous, but may destroy transistors and diodes, and should therefore be avoided.

- **When it is necessary to adjust I_{CQ} or clamp voltage after repair of the power amplifier, be sure to completely turn the semi-fixed variable resistors (VR601 ~ VR604) counterclockwise before turning on the power switch.**

- **When adjusting and measuring this set, perform ageing of the set in normal position for about 1 minute beforehand.**

- **Setting of controls and instruments to be used**

1. Output power section switch . . . . . full
2. Speaker switch . . . . . main
3. Input level volume (rear side) . . . . . MIN
4. DC voltmeter (able to measure 0.1mV)
5. Oscilloscope
6. Oscillator (1kHz oscillation, with attenuator)
7. AC electronic voltmeter
8. 8-ohm load resistor (100 Watts)

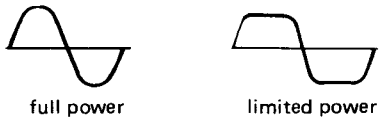
1. Constant voltage check and DC balance adjustment

Items	Connection of DC voltmeter	Adjusting parts	Adjustment
Constant voltage ⊕ power source check	Between TP401 and chassis (ground)	———	Normal when it ranges from +23V to +25V.
Constant voltage ⊖ power source check	Between TP402 and chassis (ground)	———	Normal when it ranges from −23V to −25V.

Items	Connection of DC voltmeter	Adjusting parts	Adjustment
DC balance	Main speaker terminals of L (left)	L (left) channel VR301 R (right) channel VR302	• Adjust it so that 0mV is indicated on DC voltmeter (30mV range). • If it is not adjustable by variable resistor, cut off the jumper wire J301 (L channel) and J302 (R channel)

2. Inspection of limited power

1. Connect the oscillator to input terminal (normal) and apply 1 kHz 700mV.
2. Connect the load resistance and oscilloscope in parallel to speaker terminal.
3. Set the input adjusting variable resistor to the maximum point.
4. Shift the output switch from "full" to "limited". Then the output waveform is clipped if the circuit is in normal conditions.



3. Adjustment of clamp voltage

* No load is connected.

Channel	DC voltmeter connection	Part adjusted	Adjustment
Channel L (left)	Between TP1 and TP3	VR 603	Adjust to 0.1 mV.
Channel R (right)	Between TP2 and TP4	VR 604	Adjust to 0.1 mV.

4. Adjustment of I_{CQ}

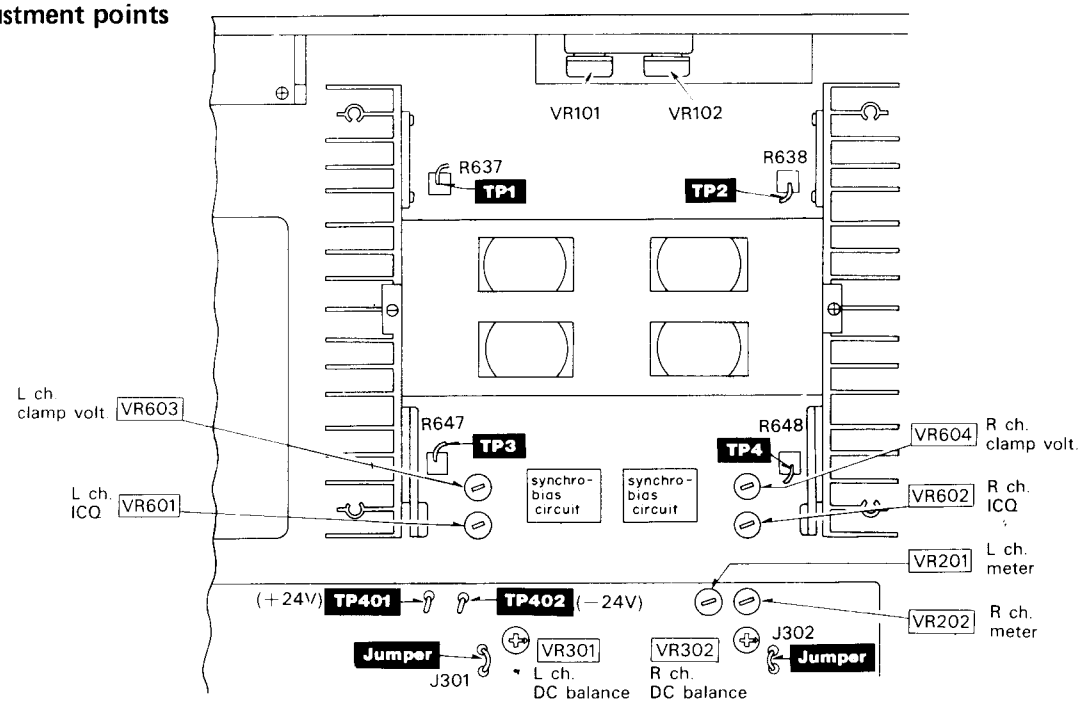
Channel	DC voltmeter connection	Part adjusted	Adjustment
Channel L (left)	Between TP1 and TP3	VR 601	Adjust to 15 mV.
Channel R (right)	Between TP2 and TP4	VR 602	Adjust to 15 mV.

(Note) Since I_{CQ} is unstable for about 15 minutes after turning on the power supply, be sure to perform ageing for at least 15 minutes and make sure that the voltage is in a range of 1mV ~ 20mV.

5. Meter adjustment

1. Connect the oscillator to the input terminal (normal) and apply 1 kHz signal.
2. Connect the load resistance and AC voltmeter in parallel to the speaker terminal.
3. Set the input level adjusting VR to the maximum point.
4. Adjust the output level of the oscillator so that the output from the speaker terminal is 28.3V.
5. Adjust VR201 (L channel) and VR202 (R channel) so that the meter indicates 100W.

• Adjustment points



■ EINSTELLUNGSANWEISUNGEN ■■■■■■■■■■ DEUTSCH ■■■■■■■■■■

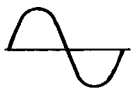
- **Wenn es nach Reparatur des Leistungsverstärkers nötig ist, ICQ oder die Klemmschaltung zu justieren, die halbfest eingestellten Drehwiderstände (VR601~VR604) bis zum Anschlag entgegen dem Uhrzeigersinn drehen, bevor der Netzschalter eingeschaltet wird.**
- **Bevor an diesem Gerät irgendwelche Justier- und Meßarbeiten durchgeführt werden, muß es mindestens ca. 1 Minute lang in normalem Betrieb eingeschaltet sein.**
- **Einstellung der zu verwendenden Regler und Instrumente**
  1. Ausgangsleistungs-Wahlschalter . . . . . full
  2. Lautsprecherschalter . . . . . main
  3. Eingangspegel-Volumen (Rückseite) . . . . . MIN
  4. Gleichstrom-Voltmeter (für Messung von 0,1mV geeignet)
  5. Oszilloskop
  6. Oszillator (1kHz-Oszillation, mit Dämpfer)
  7. Elektronisches Wechselstrom-Voltmeter
  8. 8Ohm-Belastungs-Widerstand (100Watt)

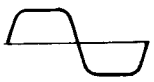
1. Prüfung der gleichbleibenden Spannung und Gleichstrom-Balance-Justierung

Posten	Gleichstrom-Voltmeter-Anschluß	Zu justierende Teile	Justierung
Prüfung der Stromversorgung mit gleichbleibender Spannung ⊕	Zwischen TP401 und Chassis (Masse)	———	Normal, wenn innerhalb des Bereichs +23V bis +25V.
Prüfung der Stromversorgung mit gleichbleibender Spannung ⊖	Zwischen TP402 und Chassis (Masse)	———	Normal, wenn innerhalb des Bereichs −23V bis −25V.
Gleichstrom-Balance	Hauptlautsprecher-Anschlüsse des linken Kanals	Linker Kanal VR301 Rechter Kanal VR302	• So abstimmen, daß das Gleichstrom-Voltmeter 0mV anzeigt (30mV-Bereich). • Falls die Abstimmung mit dem Drehwiderstand nicht möglich ist, Schaltaderdrähte J301 (linker Kanal) und J302 (rechter Kanal) abtrennen.

2. Überprüfung der begrenzten Ausgangsleistung

1. Den Oszillator an den Eingangsanschluß (normal) anschließen und 1kHz 700mV zuführen.
2. Belastungswiderstand und Oszilloskop in Parallelschaltung an den Lautsprecheranschluß anschließen.
3. Den Eingangsregelwiderstand auf Maximum einstellen.
4. Den Ausgangsschalter von "full" auf "limited" umschalten. Wenn die Schaltung in normalem Zustand ist, ist die Ausgangswellenform beschnitten.


Volle Leistung


Beschränkte Leistung

3. Justierung der Klemmspannung

* Es ist keine Belastung angeschlossen.

Kanal	Gleichstrom-Voltmeter-Anschluß	Zu justierendes Teil	Justierung
Kanal L (links)	Zwischen TP1 und TP3	VR603	Auf 0,1mV abgleichen.
Kanal R (rechts)	Zwischen TP2 und TP4	VR604	Auf 0,1mV abgleichen.

4. I_{CQ}-Justierung

Kanal	Gleichstrom-Voltmeter-Anschluß	Zu justierendes Teil	Justierung
Kanal (links)	Zwischen TP1 und TP3	VR601	Auf 15mV abgleichen.
Kanal R (rechts)	Zwischen TP2 und TP4	VR602	Auf 15mV abgleichen.

(Anmerkung) Da I_{CQ} während ca. 15 Minuten nach dem Einschalten der Stromversorgung unstabil bleibt, muß das Gerät vor der justierung mindestens 15 Minuten lang warmlaufen.
Überprüfen, daß die Spannung im Bereich 1mV ~ 20mV liegt.

5. Justierung des Meters

1. Den Oszillator an den Eingangsanschluß (normal) anschließen und 1kHz-Signal zuführen.
2. Den Belastungswiderstand und das Wechselstrom-Voltmeter parallel an den Lautsprecheranschluß anschließen.
3. Den Drehwiderstand, der den Eingangspegel regelt, auf Maximum einstellen.
4. Den Ausgangspegel des Oszillators so abstimmen, daß der Ausgang vom Lautsprecheranschluß 28,3V beträgt.
5. VR201 (linker Kanal) und VR202 (rechter Kanal) so abstimmen, daß das Meter 100W anzeigt.

■ INSTRUCTIONS DE REGLAGE — FRANÇAIS

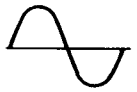
- **Lorsqu'il est nécessaire de régler ICQ ou la tension de stabilisation après la réparation de l'amplificateur de puissance, s'assurer de tourner complètement les résistances variables semifixes (VR601~VR604) dans le sens inverse des aiguilles d'une montre avant de mettre en marche le commutateur d'alimentation.**
- **Lorsqu'on fait une mise au point et un mesurage de cet appareil, exécuter préalablement un vieillissement de l'équipement en position normale pendant à peu près 1 minute.**
- **Réglage des commandes et des appareils à utiliser**
  1. Commutateur de la section de la puissance de sortie . . . . . à fond
  2. Commutateur de haut-parleur . . . . . principal
  3. Volume du niveau d'entrée (côté arrière) . . . . . MIN
  4. Voltmètre à C.C. (capable de mesurer 0,1mV)
  5. Oscilloscope
  6. Oscillateur (Oscillation de 1kHz, avec atténuateur)
  7. Voltmètre électronique à C.A.
  8. Résistance de charge de 8 ohms (100 watts)

1. Vérification de la tension constante et réglage de l'équilibrage à C.C.

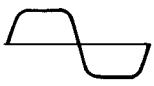
Points	Branchement du voltmètre à C.C.	Eléments à régler	Réglage
Vérification de la source d'énergie de la tension constante "⊕".	Entre TP401 et le châssis (masse)	———	Normale lorsqu'elle s'étage de +23V à +25V.
Vérification de la source d'énergie de la tension constante "⊖".	Entre TP402 et le châssis (masse)	———	Normale lorsqu'elle s'étage de −23V à −25V.
Equilibrage C.C.	Bornes du haut-parleur principal de L (gauche)	Canal L (gauche) VR301 Canal R (droite) VR302	• Le régler de façon à ce que 0mV soit indiqué sur le voltmètre à C.C. (plage de 30mV). • S'il n'est pas réglable par la résistance variable, couper le fil de connexion J301 (canal de gauche) et J302 (canal de droite).

2. Inspection de la puissance limitée

1. Brancher l'oscillateur à la borne d'entrée (ordinaire) et appliquer 1kHz 700mV.
2. Brancher la résistance de charge et l'oscilloscope en parallèle à la prise du haut-parleur.
3. Régler la résistance variable d'ajustement d'entrée au point maximal.
4. Déplacer la manette de puissance de sortie de "full" (total) à "limited" (limité). Ainsi, la forme d'onde de sortie sera coupée si le circuit est en conditions normales.



Pleine puissance



Puissance limitée

3. Mise au point de la tension de stabilisation

* Aucune charge n'est mise en circuit.

Canal	Branchement du voltmètre C.C.	Pièce à régler	Ajustement
Canal L (gauche)	Entre TP1 et TP3	VR603	Ajuster sur 0,1mV.
Canal R (droite)	Entre TP2 et TP4	VR604	Ajuster sur 0,1mV.

4. Réglage de I_{CQ}

Canal	Branchement du voltmètre C.C.	Pièce à régler	Ajustement
Canal L (gauche)	Entre TP1 et TP3	VR601	Ajuster sur 15mV.
Canal R (droite)	Entre TP2 et TP4	VR602	Ajuster sur 15mV.

(Nota) Etant donné que I_{CQ} est instable pendant à peu près 15 minutes après la mise en marche de l'alimentation, s'assurer d'exécuter un vieillissement d'au moins 15 minutes et vérifier que la tension soit bien dans une plage de 1mV~20mV.

5. Réglage du mesureur

1. Brancher l'oscillateur dans la borne d'entrée (normale) et appliquer un signal de 1kHz.
2. Brancher en parallèle la résistance de charge et le voltmètre à C.A. à la borne du haut-parleur.
3. Régler l'ajustement VR du niveau d'entrée au point maximum.
4. Ajuster le niveau de sortie à l'oscillateur de façon à ce que la sortie de la borne du haut-parleur soit de 28,3V.
5. Ajuster VR201 (canal de gauche) et VR202 (canal de droite) de façon à ce que le mesureur indique 100W.

■ PROTECTION CIRCUITRY INDICATOR

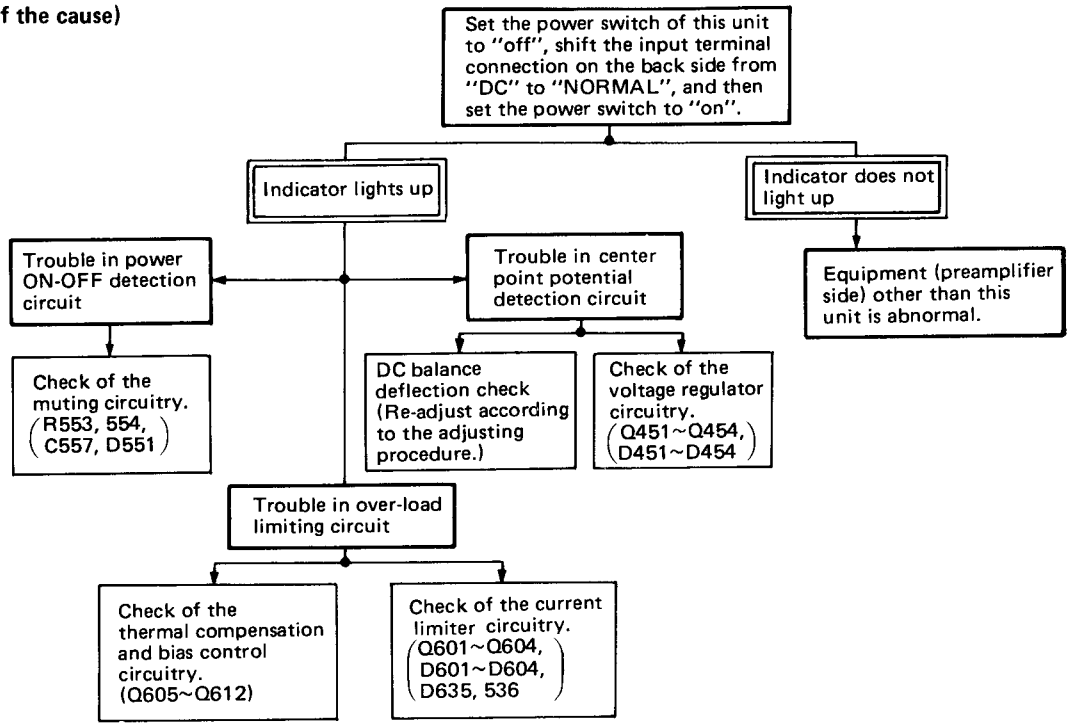
The indicator lights up when a trouble occurs in this unit.
With the power switch set to "on", the indicator lights up, and it goes out when the unit is in normal operation (about 7 sec. later). If abnormality takes place during operation, the indicator lights up or blinks. In that case, set the power switch to "off" and check the cause according to the following procedure.

• When the indicator lights up:

(Cause)

1. Due to troubles in other equipment (preamp., etc.), direct current is applied to the input, causing the protection circuit to operate.
2. This unit is in trouble, causing the protective circuit to operate.

(Check of the cause)

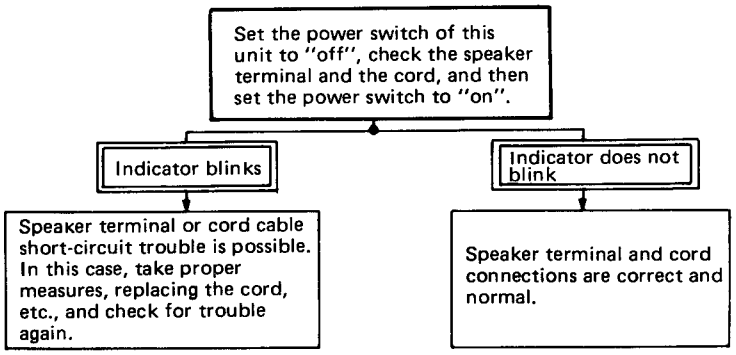

Set the power switch of this unit to "off", shift the input terminal connection on the back side from "DC" to "NORMAL", and then set the power switch to "on".
Indicator lights up
Indicator does not light up
Trouble in power ON-OFF detection circuit
Trouble in center point potential detection circuit
Equipment (preamplifier side) other than this unit is abnormal.
Check of the muting circuitry. (R553, 554, C557, D551)
DC balance deflection check (Re-adjust according to the adjusting procedure.)
Check of the voltage regulator circuitry. (Q451~Q454, D451~D454)
Trouble in over-load limiting circuit
Check of the thermal compensation and bias control circuitry. (Q605~Q612)
Check of the current limiter circuitry. (Q601~Q604, D601~D604, D635, 536)

• When the indicator blinks:

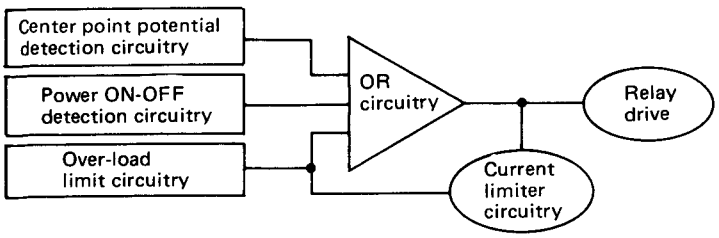
(Cause)

The speaker terminals or the power cord cable (positive and negative) are short-circuited, causing the protection circuit to operate.

(Check of the cause)


Set the power switch of this unit to "off", check the speaker terminal and the cord, and then set the power switch to "on".
Indicator blinks
Indicator does not blink
Speaker terminal or cord cable short-circuit trouble is possible. In this case, take proper measures, replacing the cord, etc., and check for trouble again.
Speaker terminal and cord connections are correct and normal.

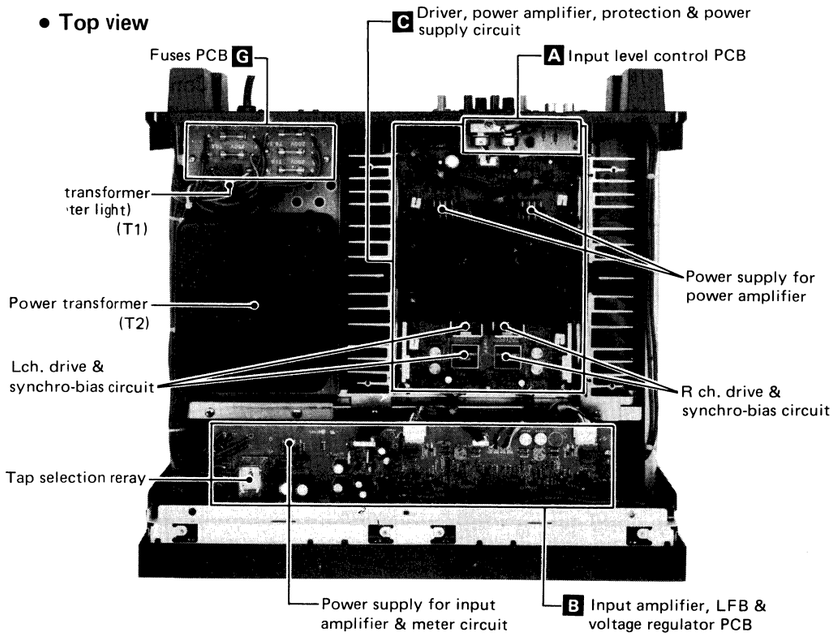
• The block diagram of the protection circuit is shown below.



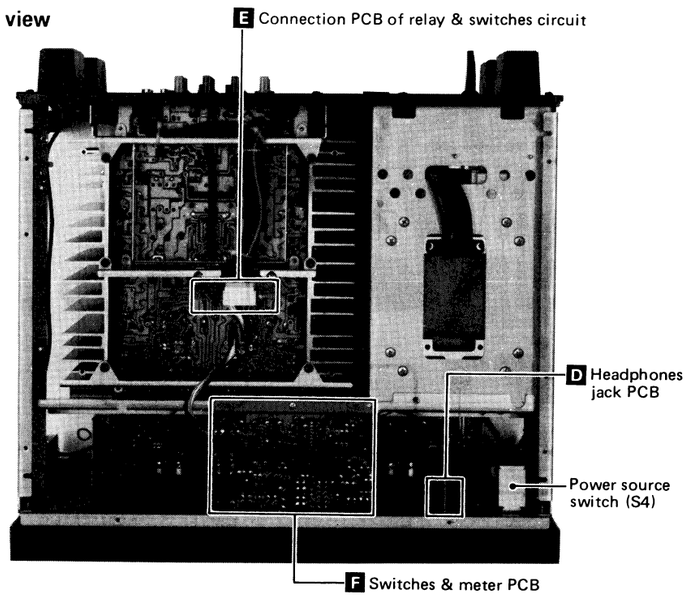
* If the speaker impedance is too low (less than 3Ω), the limiter circuit operates and power is extremely reduced. (Relay does not operate.)

■ PRINTED CIRCUIT BOARDS LOCATION

• Top view



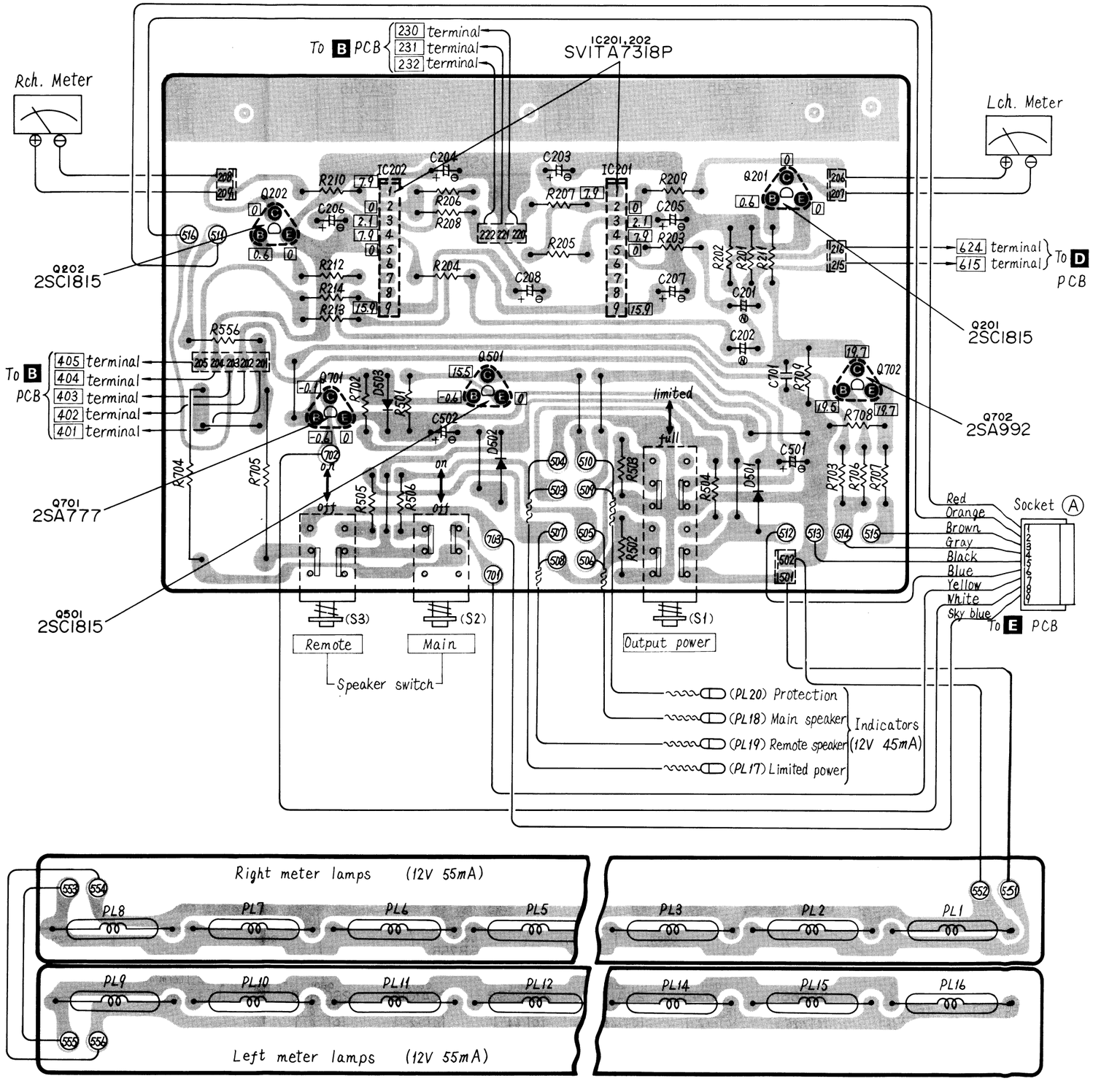
• Bottom view



■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

F Switches & meter circuitry

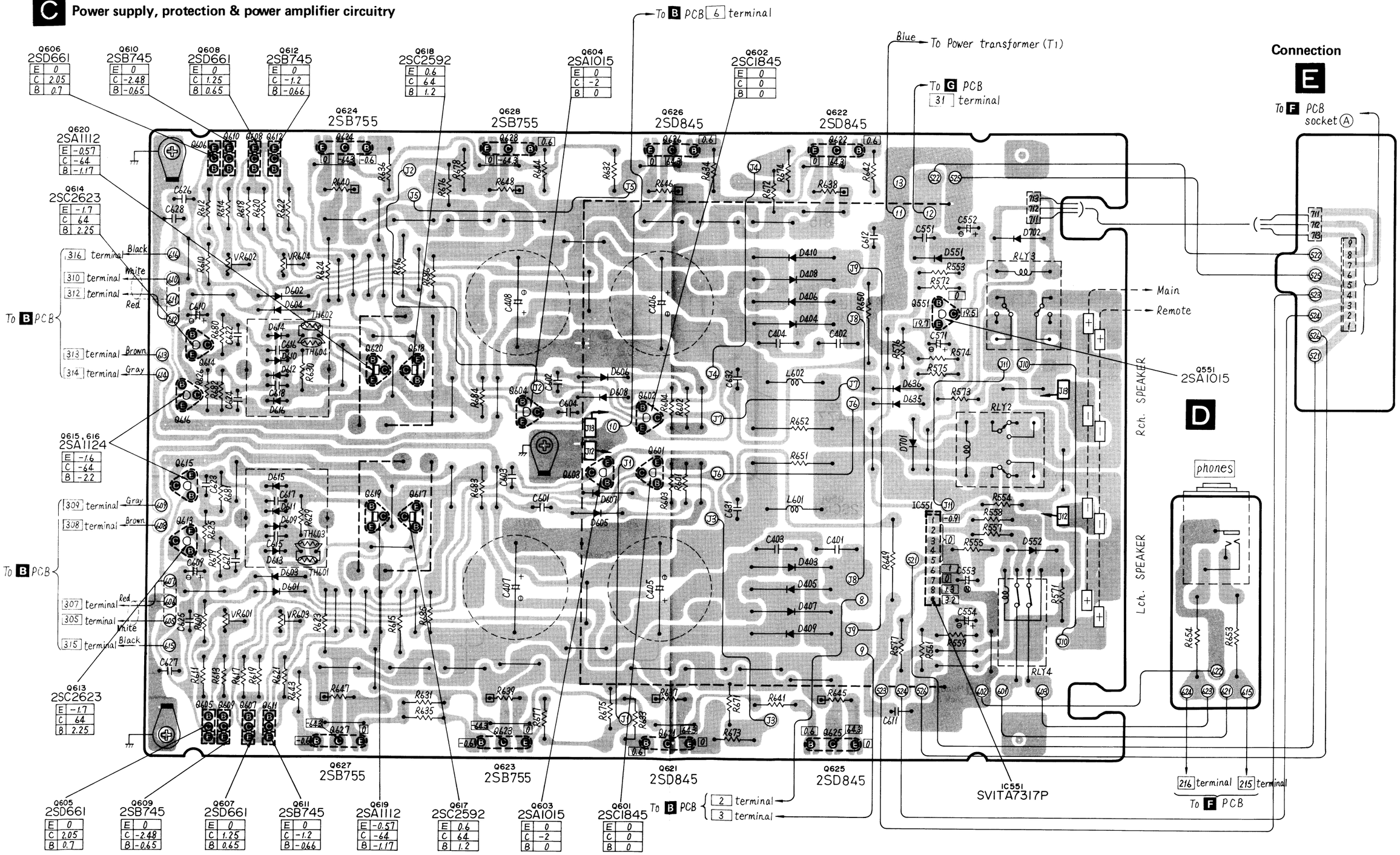
Ground (Earth) lines



■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

Ground (Earth) lines

C Power supply, protection & power amplifier circuitry


Q606 2SD661 E 0 C 2.05 B 0.7
Q610 2SB745 E 0 C -2.48 B -0.65
Q608 2SD661 E 0 C 1.25 B 0.65
Q612 2SB745 E 0 C -1.2 B -0.66
Q618 2SC2592 E 0.6 C 64 B 1.2
Q604 2SA1015 E 0 C -2 B 0
Q602 2SC1845 E 0 C 0 B 0
To B PCB 6 terminal
Blue To Power transformer (T1)
To G PCB 31 terminal
Q624 2SB755
Q628 2SB755
Q626 2SD845
Q622 2SD845
Q620 2SA1112 E -0.57 C -64 B -1.17
Q614 2SC2623 E -1.7 C 64 B 2.25
316 terminal Black
310 terminal White
312 terminal Red
313 terminal Brown
314 terminal Gray
To B PCB
Q615, 616 2SA1124 E -1.6 C -64 B -2.2
309 terminal Gray
308 terminal Brown
307 terminal Red
305 terminal White
315 terminal Black
Q613 2SC2623 E -1.7 C 64 B 2.25
Q605 2SD661 E 0 C 2.05 B 0.7
Q609 2SB745 E 0 C -2.48 B -0.65
Q607 2SD661 E 0 C 1.25 B 0.65
Q611 2SB745 E 0 C -1.2 B -0.66
Q619 2SA1112 E -0.57 C -64 B -1.17
Q617 2SC2592 E 0.6 C 64 B 1.2
Q603 2SA1015 E 0 C -2 B 0
Q601 2SC1845 E 0 C 0 B 0
Q627 2SB755
Q623 2SB755
Q621 2SD845
Q625 2SD845
To B PCB 2 terminal
3 terminal
Q551 2SA1015
Main
Remote
Rch. SPEAKER
Lch. SPEAKER
IC551 SVITA7317P
phones
216 terminal 215 terminal
To F PCB
Connection
E
To F PCB socket (A)
D

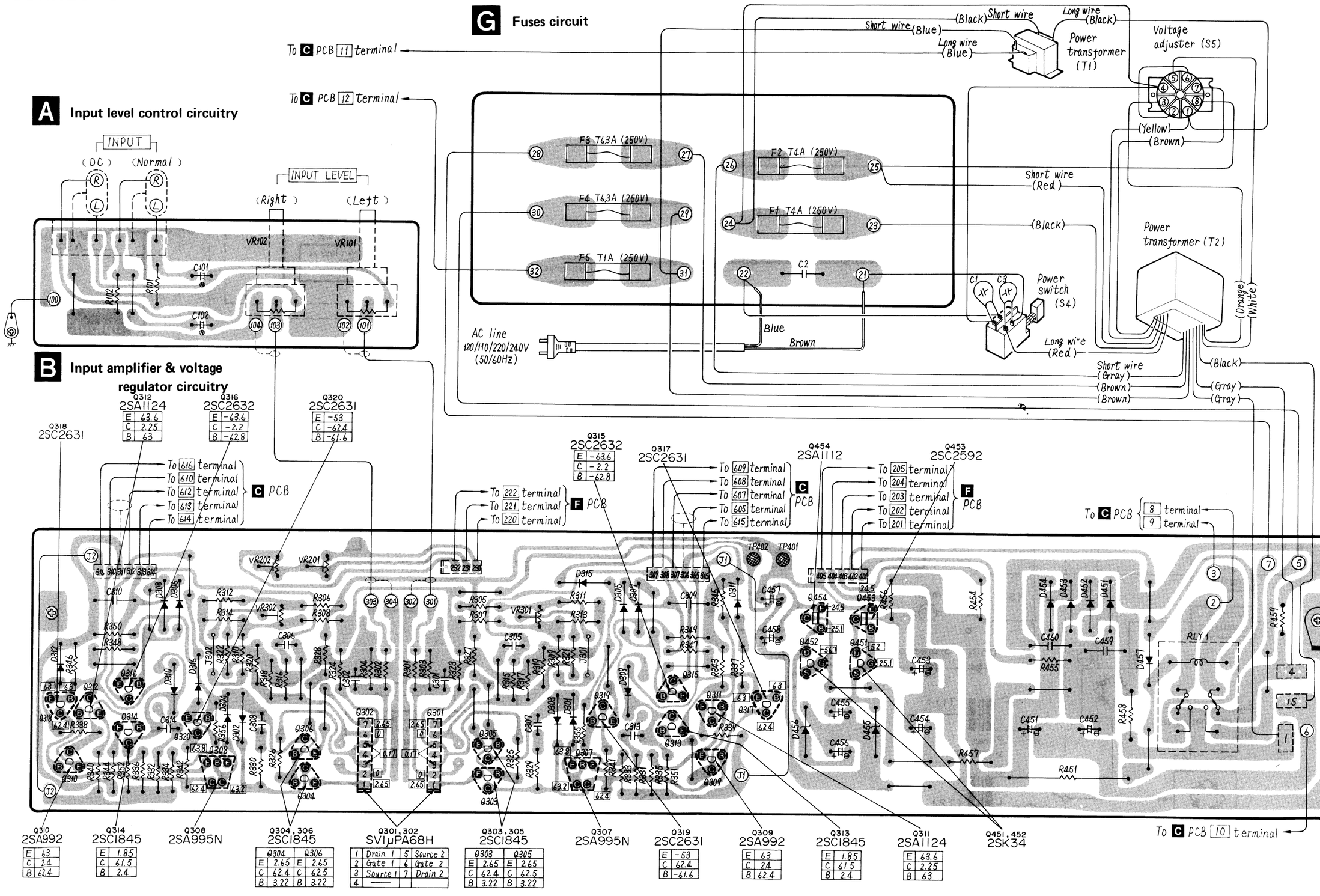
■ CIRCUIT BOARD AND WIRING CONNECTION DIAGRAM

Ground (Earth) lines

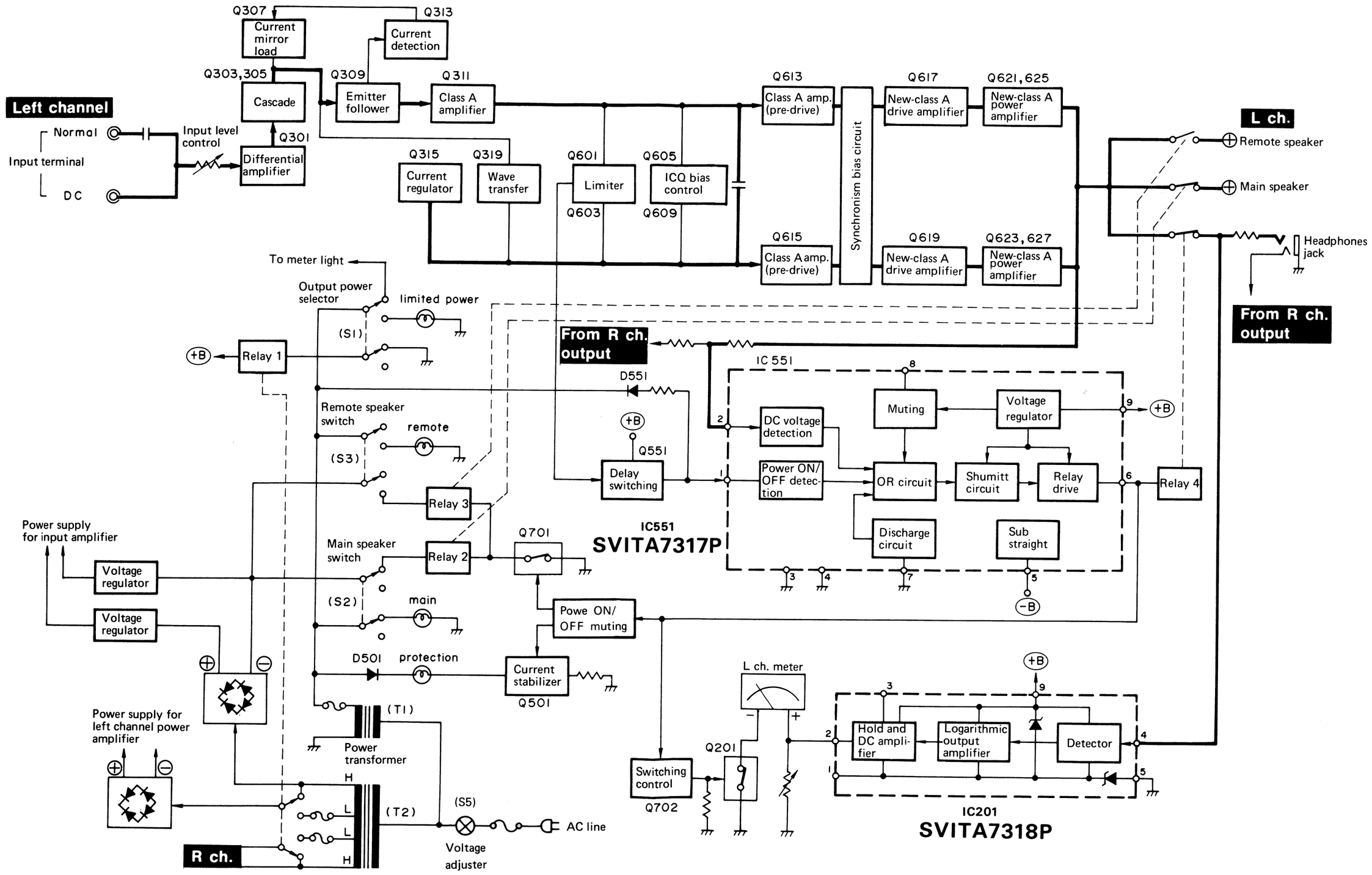
A Input level control circuitry

B Input amplifier & voltage regulator circuitry

G Fuses circuit



■ BLOCK DIAGRAM



■ REPLACEMENT PARTS LIST (Resistors and Capacitors)

Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

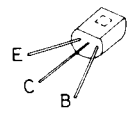
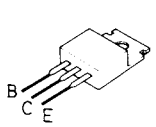
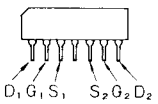
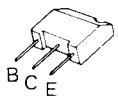
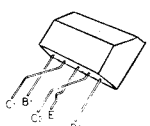
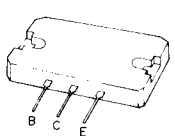
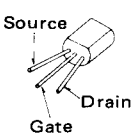
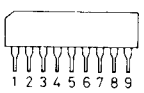
Ref. No.		Part No.	Part Name & Description
RESISTORS			
R101, 102		**ERD25TJ224**	Carbon, 220kΩ, 1/4W, ±5%
R201, 202		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%
R203, 204		ERO25CKF1962	Metal Film, 19.6kΩ, 1/4W, ±5%
R205, 206		**ERD25TJ824**	Carbon, 820kΩ, 1/4W, ±5%
R207, 208		**ERD25FJ221**	Carbon, 220Ω, 1/4W, ±5%
R209, 210		**ERD25FJ471**	Carbon, 470Ω, 1/4W, ±5%
R211, 212		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%
R213, 214	⚠	**ERD25FJ102**	Carbon, 1kΩ, 1/4W, ±5%
R301, 302		**ERD25FJ102**	Carbon, 1kΩ, 1/4W, ±5%
R303, 304		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%
R305, 306		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ±5%
R307, 308		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ±5%
R309, 310		**ERD25FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%
R311, 312		**ERD25FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%
R313, 314		**ERD25FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%
R315, 316		ERO25CKF1502	Metal Film, 15kΩ, 1/4W, ±1%
R317, 318	⚠	**ERD25FJ561**	Carbon, 560Ω, 1/4W, ±5%
R319, 320		**ERD25FJ562**	Carbon, 5.6kΩ, 1/4W, ±5%
R321, 322		**ERD25TJ183**	Carbon, 18kΩ, 1/4W, ±5%
R323, 324		**ERD25FJ562**	Carbon, 5.6kΩ, 1/4W, ±5%
R325, 326		**ERD25FJ103**	Carbon, 10kΩ, 1/4W, ±5%
R327, 328		**ERD25TJ683**	Carbon, 68kΩ, 1/4W, ±5%
R329, 330		**ERD25FJ680**	Carbon, 68Ω, 1/4W, ±5%
R331, 332	⚠	ERD2FCG181	Carbon, 180Ω, 1/4W, ±2%
R333, 334	⚠	ERD2FCG181	Carbon, 180Ω, 1/4W, ±2%
R335, 336	⚠	ERD2FCG392	Carbon, 3.9kΩ, 1/4W, ±2%
R337, 338		**ERD25FJ562**	Carbon, 5.6kΩ, 1/4W, ±5%
R339, 340	⚠	**ERD25FJ560**	Carbon, 56Ω, 1/4W, ±5%
R341, 342		**ERD25FJ103**	Carbon, 10kΩ, 1/4W, ±5%
R343, 344		**ERD25FJ562**	Carbon, 5.6kΩ, 1/4W, ±5%
R345, 346		**ERD25TJ683**	Carbon, 68kΩ, 1/4W, ±5%
R347, 348	⚠	**ERD25FJ680**	Carbon, 68Ω, 1/4W, ±5%
R349, 350		**ERD25TJ473**	Carbon, 47kΩ, 1/4W, ±5%
R351, 352	⚠	**ERD25FJ822**	Carbon, 8.2kΩ, 1/4W, ±5%
R355, 356		**ERD25TJ183**	Carbon, 18kΩ, 1/4W, ±5%
R451		**ERG3ANJ122**	Metal Oxide, 1.2kΩ, 3W, ±5%
R454, 455	⚠	**ERD25FJ220**	Carbon, 22Ω, 1/4W, ±5%
R456, 457	⚠	**ERD25FJ471**	Carbon, 470Ω, 1/4W, ±5%
R458, 459	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R501	⚠	**ERD25FJ180**	Carbon, 18Ω, 1/4W, ±5%
R502, 503	⚠	**ERD25FJ680**	Carbon, 68Ω, 1/4W, ±5%
R504	⚠	**ERD25FJ151**	Carbon, 150Ω, 1/4W, ±5%
R505, 506	⚠	**ERD25FJ680**	Carbon, 68Ω, 1/4W, ±5%
R553		**ERD25FJ822**	Carbon, 8.2kΩ, 1/4W, ±5%
R554		**ERD25TJ224**	Carbon, 220kΩ, 1/4W, ±5%
R555		**ERD25TJ333**	Carbon, 33kΩ, 1/4W, ±5%
R556	⚠	**ERD50FJ153**	Carbon, 15kΩ, 1/2W, ±5%
R557, 558		**ERD50TJ683**	Carbon, 68kΩ, 1/4W, ±5%
R559		**ERD25TJ224**	Carbon, 220kΩ, 1/4W, ±5%
R561		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ±5%
R571	⚠	**ERD50FJ152**	Carbon, 1.5kΩ, 1/2W, ±5%
R572		**ERD25FJ103**	Carbon, 10kΩ, 1/4W, ±5%
R573, 574		**ERD25TJ223**	Carbon, 22kΩ, 1/4W, ±5%
R575		**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ±5%
R576		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%
R577	⚠	**ERD50FJ152**	Carbon, 1.5kΩ, 1/2W, ±5%
R601, 602	⚠	**ERD25FJ272**	Carbon, 2.7kΩ, 1/4W, ±5%
R603, 604	⚠	**ERD25FJ272**	Carbon, 2.7kΩ, 1/4W, ±5%
R609, 610	⚠	**ERD25FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%
R611, 612	⚠	**ERD25FJ122**	Carbon, 1.2kΩ, 1/4W, ±5%
R613, 614	⚠	**ERD25FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%
R615, 616		**ERG1ANJ822**	Metal Oxide, 8.2kΩ, 1W ±5%
R617, 618	⚠	**ERD25FJ821**	Carbon, 820Ω, 1/4W, ±5%
R619, 620	⚠	**ERD25FJ152**	Carbon, 1.5kΩ, 1/4W, ±5%
R621, 622	⚠	**ERD25FJ821**	Carbon, 820Ω, 1/4W, ±5%
R623, 624		**ERG1ANJ822**	Metal Oxide, 8.2kΩ, 1W, ±5%
R625, 626	⚠	**ERD25FJ102**	Carbon, 1kΩ, 1/4W, ±5%
R629, 630		**ERD25TJ823**	Carbon, 82kΩ, 1/4W, ±5%
R631, 632	⚠	**ERD25FJ221**	Carbon, 220Ω, 1/4W, ±5%
R633, 634	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R635, 636	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R637, 638	⚠	ERF3RKR33	Non-Flammable, 0.33Ω, 3W, ±10%
R639, 640	⚠	ERF3RKR33	Non-Flammable, 0.33Ω, 3W, ±10%
R641, 642	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R643, 644	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R645, 646	⚠	ERF3RKR33	Non-Flammable, 0.33Ω, 3W, ±10%
R647, 648	⚠	ERF3RKR33	Non-Flammable, 0.33Ω, 3W, ±10%
R649, 650		**ERG2ANJ120**	Metal Oxide, 12Ω, 2W, ±5%
R651, 652		**ERG2ANJ120**	Metal Oxide, 12Ω, 2W, ±5%
R653, 654		**ERG2ANJ331**	Metal Oxide, 330Ω, 2W, ±5%
R671, 672	⚠	**ERD25FJ681**	Carbon, 680Ω, 1/4W, ±5%
R673, 674	⚠	**ERD25FJ331**	Carbon, 330Ω, 1/4W, ±5%
R675, 676	⚠	**ERD25FJ681**	Carbon, 680Ω, 1/4W, ±5%
R677, 678	⚠	**ERD25FJ331**	Carbon, 330Ω, 1/4W, ±5%
R679, 680	⚠	**ERD25FJ681**	Carbon, 680Ω, 1/4W, ±5%
R681, 682	⚠	**ERD25FJ681**	Carbon, 680Ω, 1/4W, ±5%
R683, 684	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R685, 686	⚠	**ERD25FJ2R2**	Carbon, 2.2Ω, 1/4W, ±5%
R702, 703		**ERD25TJ183**	Carbon, 18kΩ, 1/4W, ±5%
R704, 705		**ERG3ANJ122**	Metal Oxide, 1.2kΩ, 3W, ±5%
R706		**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%
R707		**ERD25FJ392**	Carbon, 3.9kΩ, 1/4W, ±5%
R708		**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ±5%
R709		**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ±5%
CAPACITORS			
C1, 3	⚠	ECKDKC103PF	Ceramic, 0.01μF, 400VAC, $^{+100}_{-0}$%
C2	⚠	ECQE2A473MCS	Polyester, 0.047μF, 250VAC, ±20%
C101, 102	⚠	ECEA1HN2R2S	Non-Polar Electrolytic, 2.2μF, 50V
C201, 202	⚠	ECEA1EN3R3S	Non-Polar Electrolytic, 3.3μF, 25V
C203, 204		**ECEA50ZR47**	Electrolytic, 0.47μF, 50V
C205, 206		**ECEA50ZR47**	Electrolytic, 0.47μF, 50V
C207, 208		**ECEA1ES470**	Electrolytic, 47μF, 25V
C301, 302		ECCD1H151K	Ceramic, 150pF, 50V, ±10%
C305, 306		ECCD1H270K	Ceramic, 27pF, 50V, ±10%
C307, 308		ECKD1H471KB	Ceramic, 470pF, 50V, ±10%
C309, 310		ECKD2H103PE	Ceramic, 0.01μF, 500V, $^{+100}_{-0}$%
C313, 314		ECKD1H471KB	Ceramic, 470pF, 50V, ±10%
C401, 402		ECKD2H103PE	Ceramic, 0.01μF, 500V, $^{+100}_{-0}$%
C403, 404		ECKD2H103PE	Ceramic, 0.01μF, 500V, $^{+100}_{-0}$%
C405, 406		ECET71R103Y	Electrolytic, 10000μF, 71V
C407, 408		ECET71R103Y	Electrolytic, 10000μF, 71V
C451, 452		**ECEA2AS101**	Electrolytic, 100μF, 100V
C453, 454		**ECEA1JS470**	Electrolytic, 47μF, 63V
C455, 456,		**ECEA1JS330**	Electrolytic, 33μF, 63V
C457, 458		**ECEA1JS330**	Electrolytic, 33μF, 63V
C459, 460		ECKD2H103PE	Ceramic, 0.01μF, 500V, $^{+100}_{-0}$%
C501		**ECEA1ES101**	Electrolytic, 100μF, 25V
C502		**ECEA50Z3R3**	Electrolytic, 3.3μF, 50V
C551		ECKD1H102MD	Ceramic, 0.001μF, 50V, ±20%
C552		**ECEA50Z3R3**	Electrolytic, 3.3μF, 50V
C553	⚠	**ECEA16N220**	Non-Polar Electrolytic, 220μF, 16V
C554		**ECEA1CS330**	Electrolytic, 33μF, 16V
C571		**ECEA1AS470**	Electrolytic, 47μF, 10V
C601, 602		ECKD1H103MD	Ceramic, 0.01μF, 50V, ±20%
C603, 604		ECKD1H103MD	Ceramic, 0.01μF, 50V, ±20%
C609, 610		**ECEA2AS100**	Electrolytic, 10μF, 100V
C611, 612		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C615, 616,		ECKD1H681K	Ceramic, 680pF, 50V, ±10%
C617, 618		ECKD1H681K	Ceramic, 680pF, 50V, ±10%
C621, 622,		ECKD1H102MD	Ceramic, 0.001μF, 50V, ±20%
C623, 624		ECKD1H102MD	Ceramic, 0.001μF, 50V, ±20%
C625, 626		ECCD2H150K	Ceramic, 15pF, 500V, ±10%
C627, 628		ECKD2H222KB	Ceramic, 0.0022μF, 500V, ±10%
C631, 632		ECQM1H104KZ	Polyester, 0.1μF, 50V, ±10%
C701		ECKD1H103MD	Ceramic, 0.01μF, 50V, ±20%

■ REPLACEMENT PARTS LIST (Electrical parts)

Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.		Part No.	Part Name & Description
INTEGRATED CIRCUITS			
IC201, 202		SVITA7318P	IC, Meter Amplifier
IC551		SVITA7317P	IC, Protection
TRANSISTORS			
Q201, 202		2SC1815–Y	Transistor, Meter Driver (Use in ranks Y or O)
Q301, 302		SVIUPA68H–KL	Transistor, Input Differential (Use in ranks K or L)
Q303~306		2SC1845–E	Transistor, Cascade (Use in ranks E or F)
Q307, 308		2SA995N–G	Transistor, Current Mirror (Use in ranks F or G)
Q309, 310		2SA992	Transistor, Pre-Drive (Use in ranks E or F)
Q311, 312		2SA1124–R	Transistor, Pre-Drive (Use in ranks R or S)
Q313, 314		2SC1845–E	Transistor, Lenear Feed Back (Use in ranks E or F)
Q315, 316		2SC2632–R	Transistor, Current Stabilizer (Use in ranks R or S)
Q317~320		2SC2631–R	Transistor, Clamper (Use in ranks Q, R or S)
Q451, 452		2SK34–D1	Transistor, Voltage Regulator [FET]
Q453		2SC2592–R	Transistor, Voltage Regulator (Use in ranks Q, R or S)
Q454		2SA1112–R	Transistor, Voltage Regulator (Use in ranks Q, R or S)
Q501		2SC1815–Y	Transistor, Current Stabilizer (Use in ranks Y or O)
Q551		2SA1015–Y	Transistor, Switching (Use in ranks Y or O)
Q601, 602		2SC1845–E	Transistor, Limiter (Use in ranks E or F)
Q603, 604		2SA1015–Y	Transistor, Limiter (Use in ranks Y or O)
Q605~608		2SD661–S	Transistor, Bias Control (Use in ranks R or S)
Q609~612		2SB745–S	Transistor, Bias Control (Use in ranks R or S)
Q613, 614		2SC2632–R	Transistor, Driver (Use in ranks R or S)
Q615, 616		2SA1124–R	Transistor, Driver (Use in ranks R or S) (Use pair ranks as same as Q613, 614, 615 and 616)
Q617, 618		2SC2592–R	Transistor, Drive Amplifier
Q619, 620		2SA1112–R	Transistor, Drive Amplifier
Q621, 622, 625, 626		2SD845–R	Transistor, Power Amplifier (Use in ranks R or O)
Q623, 624, 627, 628		2SB755–R	Transistor, Power Amplifier (Use in ranks R or O) (Use pair ranks as same as Q621~627 and 628)
Q701		2SA777–Q	Transistor, Relay Switching (Use in ranks Q or R)
Q702		2SA992	Transistor, Meter Switching (Use in ranks E or F)
DIODES			
D301~304		**MA162A**	Diode, Current Mirror
D305~308		**MA27A2**	Diode, 1.2V Bias Supply
D309, 310, 315, 316		**MA162A**	Diode, Bias Supply
D311, 312		**MA27A1**	Diode, Bias Supply
D403~410	⚠	**SVDS3V40**	Rectifier, Power Amplifier
D451~454	⚠	SVDSR1K4	Rectifier, Pre-Amplifier
D455, 456		SVDMZ324B	Diode, 24V Zener
D457		**MA162A**	Diode, Pulse Killer
D501	⚠	**SVDSR1K2**	Rectifier, Lamp Power Supply
D502, 551, 603, 604		**MA162A**	Diode
D503		**MA27A2**	Diode, 1.2V Bias Supply
D552		**MA162A**	Diode, Pulse Killer
D601, 602, 605~608, 635, 636		**MA162A**	Diode, Limiter & Switching
D609~616		**20A90**	Diode, Synchronism Bias
D701, 702		**MA162A**	Diode, Pulse Killer
TRANSFORMERS			
T1	⚠	SLT5K117	Transformer, Meter Lamp Power
T2	⚠	SLT5S51	Transformer, Power
COILS			
L601, 602		SLQY16G–1U	Coil, Output Choke
VARIABLE RESISTORS			
VR101, 102		EVH6UA524B54	Input Level Control, 50kΩ(B)
VR201, 202		EVTR4SA00B32	Meter Adjustment, 300Ω(B)
VR301, 302		EVMH9GA00B53	DC Balance Adjustment, 5kΩ(B)
VR601~604		EVTR4SA00B13	ICQ & Clamp Voltage Adjustment, 1kΩ(B)
THERMISTERS			
TH601~604		ERTD2FHL333S	Thermister, 33kΩ
LAMPS			
PL1~16	⚠	XAMR74S10	Lamp, Meter (12V, 55mA)
PL17~20	⚠	**XAMR48T250**	Lamp, Indicators (12V, 45mA)
FUSES			
F1, 2	⚠	XBA2C40TRO	Fuse, T4A (250V)
F3, 4	⚠	XBA2C63TRO	Fuse, T6.3A (250V)
F5	⚠	XBA2C10TRO	Fuse, T1A (250V)
SWITCHES			
S1, 2, 3		SSH391	Switch, Speaker
S4	⚠	ESB9997S	Switch, Power
S5	⚠	ESE37200	Switch, Voltage Adjuster
RELAYS			
RLY1	⚠	SSY47	Relay, Transformer Tap Select of Secondary
RLY2, 3	⚠	SSY19–3	Relay, Speaker Select
RLY4	⚠	SSY9	Relay, Headphones & Meter Circuit
METER			
		SSM161N	Meter

• Terminal guide of IC's and transistors

2SA777, 2SC1815 2SA992, 2SC1845 2SA1015, 2SC2631 2SA1124, 2SC2632 	2SA1112, 2SC2592 	SVIμPA68H 	2SB745, 2SD661 
2SA995N 	2SA1094, 2SC2564 	2SK34 	SVITA7317P SVITA7318P 

■ SCHEMATIC DIAGRAM

Q301, 302 SVIμPA68H INPUT DIFFERENTIAL
Q303 ~ 306 2SC1845 CASCADE
Q307, 308 2SA995N CURRENT MIRROR
Q309, 310 2SA992 EMITTER FOLLOWER
Q311, 312 2SA1124 PRE DRIVE
Q313, 314 2SC1845 LINEAR FEED BACK
Q315, 316 2SC2632 CURRENT STABILIZER
Q317 ~ 320 2SC2631 CLAMPER
Q601, 602 2SC1845 PROTECTION
Q603, 604 2SA1015 PROTECTION
Q605 ~ 608 2SD661 ICQ & SYNCHRO BIAS
Q609 ~ 612 2SB745 ICQ & SYNCHRO BIAS
Q613, 614 2SC2623 DRIVER
Q615, 616 2SA1124 DRIVER
D403 ~ 410 SVDS3V20
D552, 701, 702 MA162
D551, 603, 604 MA150

NORMAL INPUT L R / DC L R
Input level control
L ch. DC balance adj.
R ch. DC balance adj.
ICQ adj.
Clamp voltage adj.
Meter adjustment
AC(11.8V)
IC 551 SVITA 7317 P RELAY DRIVE
Positive voltage line
Negative voltage line
D601, 602, 605 ~ 608, 635, 636 MA162A
D609 ~ 616 20A90
HEADPHONE
MAIN (L ch) SPEAKER
REMOTE
MAIN (R ch) SPEAKER
REMOTE
Q551 2SA1015 SWITCHING
Q451, 452 2SK34
D301 ~ 304 MA150
D305 ~ 308 SVDMA26-2
D309, 310, 315, 316 MA162
D311, 312 SVDMA26-1
D451 ~ 454 SVDSRIK4
D455, 456 SVDMZ324B
D457 MA162
Q453 2SC2592 REGULATOR
Q454 2SA1112 REGULATOR
Q617, 618 2SC2592 DRIVER
Q619, 620 2SA1112 DRIVER
Q621, 622, 625, 626 2SD845 POWER
Q623, 624, 627, 628 2SB755 POWER
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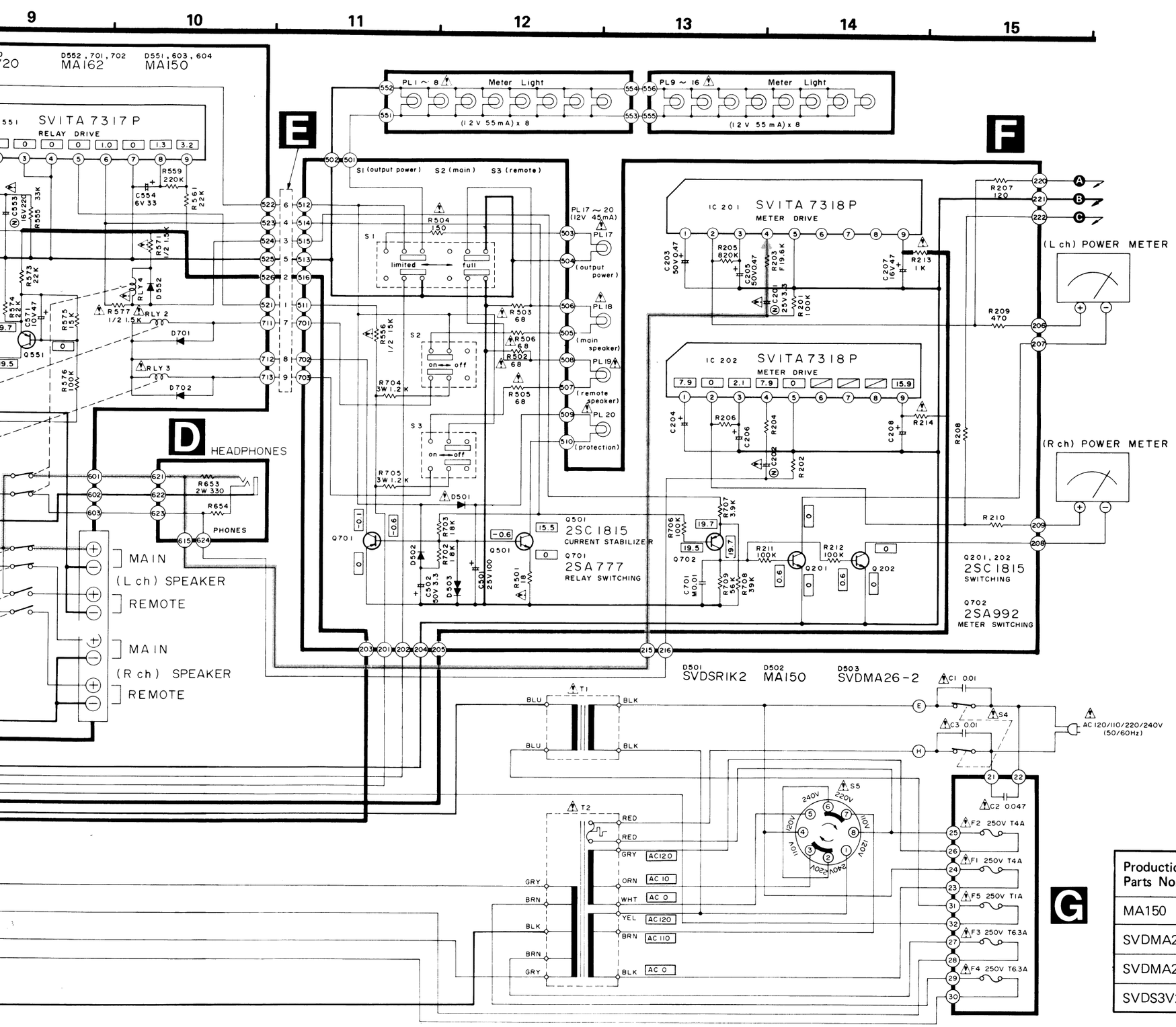


Notes:

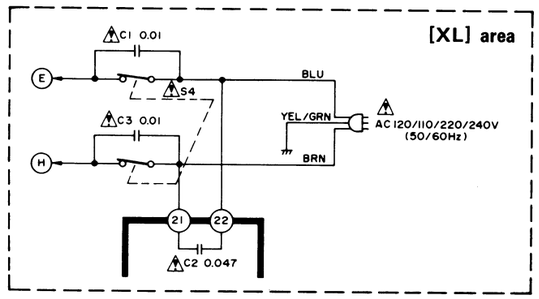
1. **S1:** Output power selector switch in **"full"** position. (full ↔ limited)
2. **S2:** Main speaker switch in **"on"** position.
3. **S3:** Remote speaker switch in **"off"** position.
4. **S4:** Power source switch in **"on"** position.
5. **S5:** Voltage adjustment switch in **"220V"** position. (240V ↔ 220V ↔ 110V ↔ 120V)
6. ▭ Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
7. Signal lines of left channel
8. ▬ Positive (⊕B) voltage lines.
9. Ⓝ indicate capacitors are non-polar electrolytic capacitor.
10. Important safety notice
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

Production Parts No.	Standardized Parts No.
MA150	MA162A
SVDMA26–2	MA27A2
SVDMA26–1	MA27A1
SVDS3V20	SVDS3V40

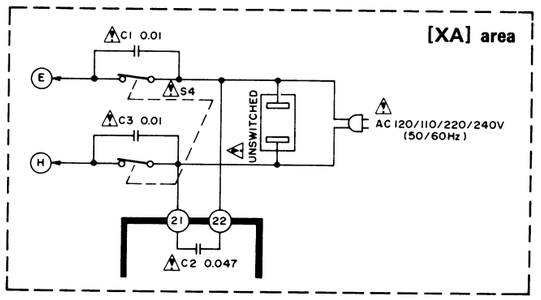
• Power source circuit

These schematic diagrams are available in Australia [XL] Asia, Latin America, Middle East and Africa [XA].

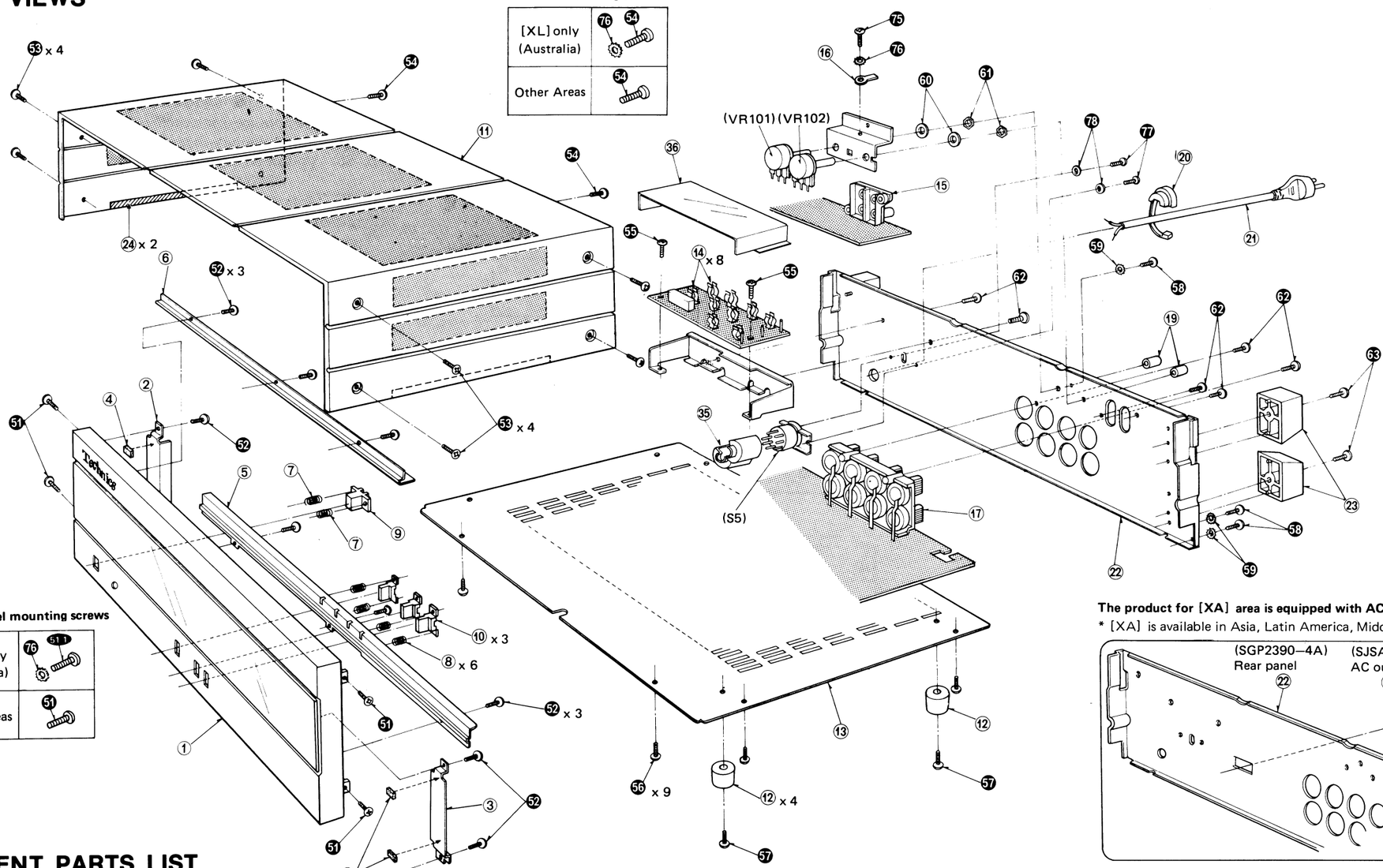
* For Australia.



*For Asia, Latin America, Middle East and Africa.



■ EXPLODED VIEWS

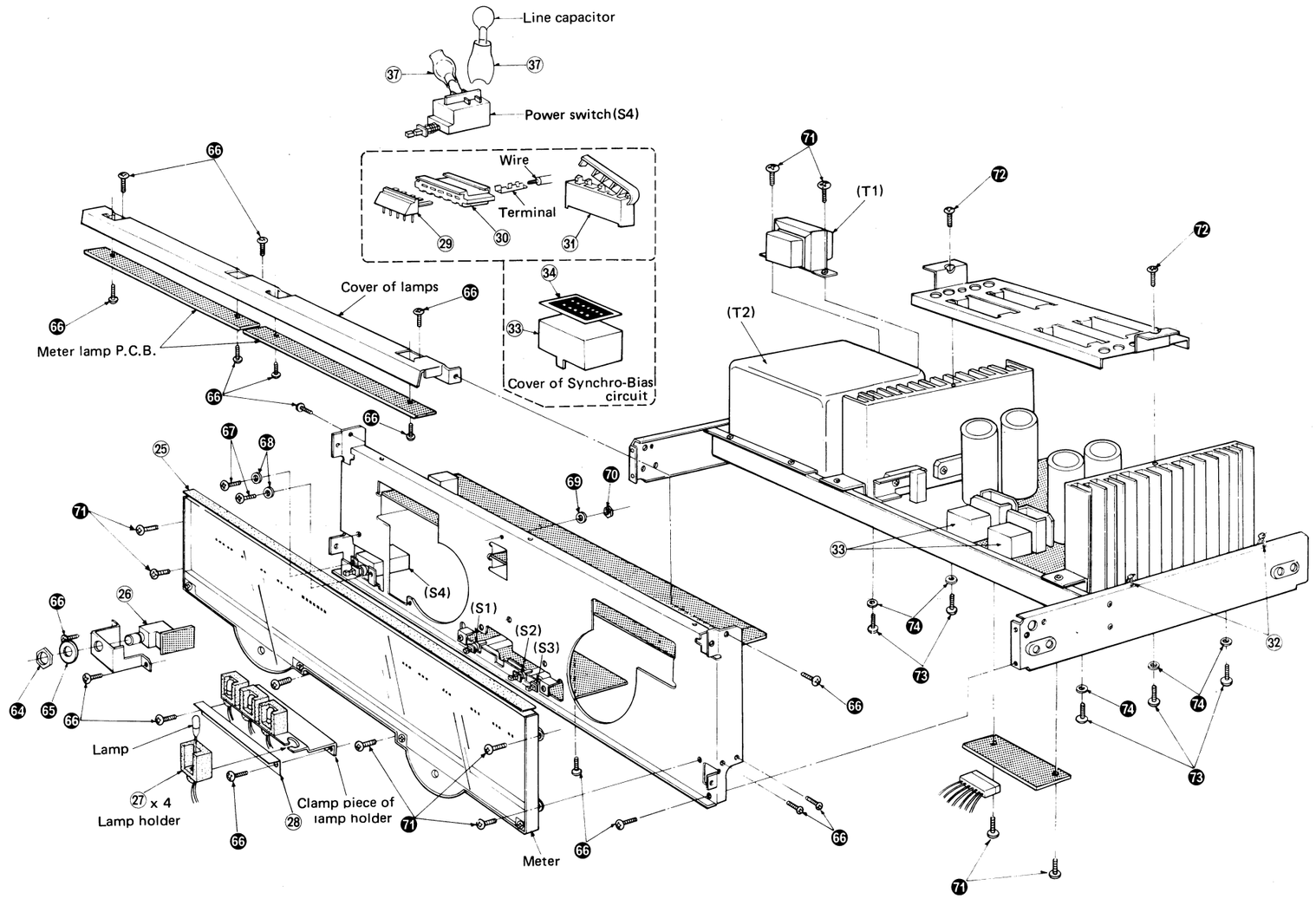


■ REPLACEMENT PARTS LIST

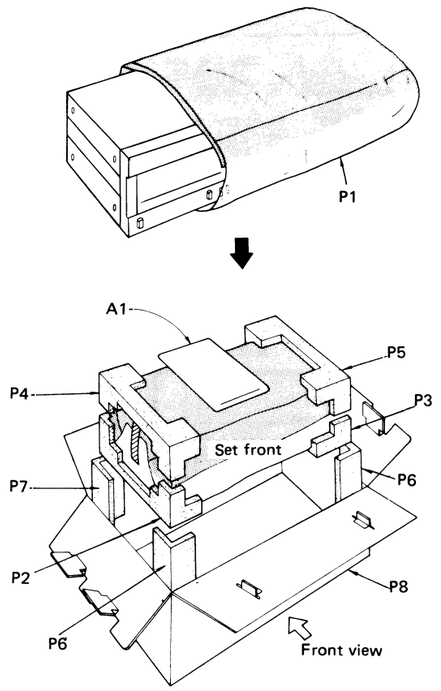
Notes: 1. Parts numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

* [D] and [EG] are available in Scandinavia and European except Switzerland, United Kingdom, Holland, France and Belgium.
* [EW] is available in Switzerland.
* [EK] is available in United Kingdom.
* [EH] is available in Holland.
* [EF] is available in France.
* [EB] is available in Belgium.
* [XL] is available in Australia.
* [XA] is available in Asia, Latin America, Middle East and Africa.

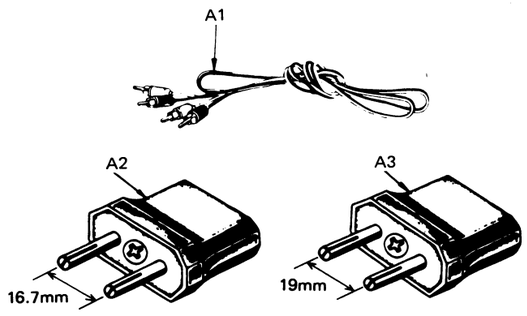
Ref. No.		Part No.	Part Name & Description
CABINET and CHASSIS PARTS			
1		SGWEA5E	Panel, Front Ass'y (with Glass)
2		SGE629–1	Panel, Left Side
3		SGE629	Panel, Right Side
4		SHG6123	Cushion, Glass
5		SGEEA5N	Panel, Lower Ass'y (with Panel Lights)
6		SGE627	Panel, Upper
7		SUS193	Spring, Power Switch Buttons
8		SUS159	Spring, Speakers Select Buttons
9		SBC261–1	Button, Power Switch
10		SBC219–2	Button, Speakers Select
11		SKC530B1	Cabinet
12		SKL247	Foot, Bottom
13		SKU8210–2	Bottom Board
14		SJT347	Holder, Fuse
15		SJF3431A	Terminal, Input
16		RJT202B	Terminal, Ground (1 pin)
17		SJF4813–1	Terminal, Speakers
18 [XA] only	⚠	SJSA66–2	Socket, AC Outlet
19		SBN613	Knob, Input Level Control
20 [EW, XA]		SFSR4N4	Bushing, AC Cord
20 [D,EG,XL]		SHR131	Bushing, AC Cord
20 [EK]		SHR129	Bushing, AC Cord
21 [D,EG]	⚠	SJA123	AC Cord
21 [EW]	⚠	SJA111	AC Cord
21 [EK]	⚠	**QFC1205M**	AC Cord
21 [XL]	⚠	**QFC1207MA**	AC Cord
21 [XA]	⚠	SJA121	AC Cord
22 [D,EH,EB,EF]		SGP2390–2A	Rear Panel
22 [EW]		SGP2390–3A	Rear Panel
22 [XA]		SGP2390–4A	Rear Panel
22 [EK]		SGPEA5EK	Rear Panel, SGP2390–3A with Name Plate SGT23550
22 [EG]		SGPEA5E	Rear Panel, SGP2390–2A with Name Plate SGT23550
22 [XL]		SGPEA5XL	Rear Panel, SGP2390–2A with Name Plate SGT23570
23		SKL241	
24		SHS2437	
25		SDU35–	
26		XCJ6P21	
27		SHG1575	
28		SHR5103	
29		SJT3209	
29		SJT3609	
30		SJS5213	
30		SJS5621	
30		SJS5905	
31		SJS5327	
31		SJS5519	
32		SHR301	
33		SUV423	
34		SGK1347	
35		SUV453	
36		SMX405	
37		SMXA65	
SCREWS, NUTS and WASHE			
51 [XL] only		**XTB3+8E**	
51		**XTS3+8E**	
52		**XTB3+8E**	



■ PACKING



• Accessories



Ref. No.		Part No.	Part Name & Description
23		SKL241	Foot, Rear
24		SHS2437	Fiber, Cabinet
25		SDU35–1	Filter, Meter Light
26		XCJ6P21B–A1	Jack, Headphones
27		SHG1575	Rubber Holder, Lamp
28		SHR5103	Clamper, Wire
29		SJT3209	Terminal, 2 pin
29		SJT3609	Terminal, 6 pin
30		SJS5213	Socket, 2 pin
30		SJS5621	Socket, 6 pin
30		SJS5905	Socket, 9 pin
31		SJS5327	Connector, 3 pin
31		SJS5519	Connector, 5 pin
32		SHR301	Clamper, Wire
33		SUV423	Cover, Synchronism Bias Circuit
34		SGK1347	Label, Synchro-Bias
35		SUV453	Cover, Voltage Adjuster
36		SMX405	Cover, Fuse P.C.B.
37		SMXA65	Cover, Line Capacitor
SCREWS, NUTS and WASHERS			
⑤1 [XL] only		**XTB3+8BFZ**	Screw, Tapping, ⊕ 3x8 (Front Panel)
51		**XTS3+8B**	Screw, Tapping, ⊕ 3x8 (Front Panel)
52		**XTB3+8BFN**	Screw, Tapping, (Right & Left Side Panel)

Ref. No.		Part No.	Part Name & Description
53		XSSS5+12F1S	Screw, Tapping, ⊕3 x 8 (Cabinet)
54		**XTB3+10BFZ**	Screw, Tapping, ⊕3 x 10 (Cabinet)
55		**XTB3+8BFN**	Screw, Tapping, ⊕3 x 8 (P.C.B.)
56		**XTB3+8BFZ**	Screw, Tapping, ⊕3 x 8 (Bottom Board)
57		**XTB3+12BFZ**	Screw, Tapping, ⊕3 x 12 (Bottom Feet)
58		**XTB3+8BFZ**	Screw, Tapping, ⊕3 x 8 (Rear Panel)
59		**XWC3B**	Washer, External Toothed Lock, ϕ3
60		**XWV8**	Washer, Spring, ϕ8
61		**XNS8**	Nut, M8 (Volume)
62		**XTB3+8BFZ**	Screw, Tapping, ⊕3 x 8 (Rear Panel)
63		**XTB4+12BFZ**	Screw, Tapping, ⊕4 x 12 (Rear Feet)
64		**XNS12**	Nut, M12 (Headphone Jack)
65		SNE59–1	Washer, Wave
66		**XTB3+8BFN**	Screw, Tapping, ⊕3 x 8 (Chassis)
67		**XSN3+6S**	Screw, ⊕3 x 6 (Switch)
68		**XWA3B**	Washer, Spring, ϕ3
69		**XWA3B**	Washer, Spring, ϕ3
70		**XNG3ES**	Nut, M3 (Meter)
71		**XTB3+8BFN**	Screw, Tapping, ⊕3 x 8 (P.T. & Meter)
72		**XTB3+8BFZ**	Screw, Tapping, ⊕3 x 8 (P.T. & Meter)
73		**XTN3+10B**	Screw, Tapping, ⊕3 x 10 (Heat Sink)
74		**XWG3**	Washer, Plain, ϕ3
75		**XTB3+8BFN**	Screw, Tapping, ⊕3 x 8 (Ground Terminal)
76		**XWC3B**	Washer, External Toothed Lock, ϕ3
77		**XSN3+8BVS**	Screw, ⊕ 3x8 (Voltage Adjuster)
78		**XWA3BFZ**	Washer, Spring ϕ3

Ref. No.		Part No.	Part Name & Description
PACKING PARTS (For [EW], [EK] and [XA] areas)			
P1		SPP653	Polyethylene Bag
P2		SPS2959	Pad, Left Lower
P3		SPS2961	Pad, Right Lower
P4		SPS2963	Pad, Left Upper
P5		SPS2965	Pad, Right Upper
P6		SPS2987	Pad, Front Corner
P7		SPS2989	Pad, Rear Corner
P8		SPG2885	Carton Box
P9 [XA]		SQF10709	Instructions Book, Printed Matter
P9 [EW, EK]		SQF10707	Instructions Book, Printed Matter
PACKING PARTS (For [D], [EG], [EF], [EH], [EB] and [XL] areas)			
P1		SPP653	Polyethylene Bag
P2		SPS2959–1	Pad, Left Lower
P3		SPS2961–1	Pad, Right Lower
P4		SPS2963	Pad, Left Upper
P5		SPS2965	Pad, Right Upper
P6		SPS3049	Pad, Front Corner
P7		SPS3051	Pad, Rear Corner
P8 [EF] only		SPG2897	Carton Box
P8 [Other Areas]		SPG2883	Carton Box
P9		SQF10707	Instructions Book, Printed Matter

Ref. No.		Part No.	Part Name & Description
ACCESSORIES			
A1		SJP2239	Cord, Stereo Pin Type Connection
A2 [XA] only	⚠	RJP74–1	Plug Adaptor, AC Power Source
A3 [XA] only	⚠	RJP75	Plug Adaptor, AC Power Source

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SERVICE NEWS

Panasonic Service
Deutschland GmbH

TO ALL
KDZ AND PSDG-BRANCHES

No.: 87/85	Date: 23.5.1985 rg/pr
SUBJECT	TEXT

NO SOUND

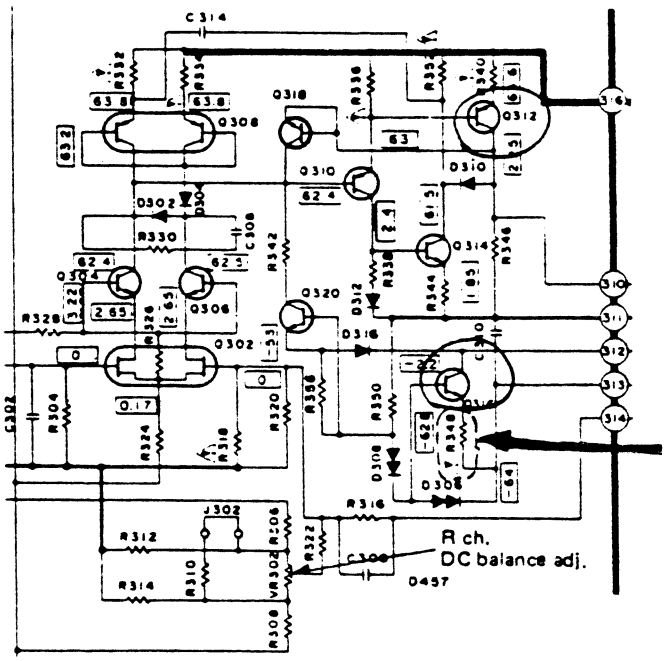
SE-A5

Symptom

Q311, Q312, Q315 and Q316 break down due to overcurrent.

Repair Method

Change R347 and R348 from 68 Ω to 100 Ω (ERD25FJ101).



Change to 100 Ω.

* R-CH only

PSDC-Wiesbaden
B. Regl

-Military SVC-